COAL AGE

Vol. 2 NEW YORK, AUGUST 10, 1912 No. 6

[*The following foreword, written for Coal Age by A. W. Hesse, asst. chief engineer, Consolidation Coal Co., Fairmont, W. Va., is of so much practical value that all coal men are urged to read his suggestions, and we especially invite discussion by those who have had experience using terra-cotta blocks, or any similar material, in the construction of air-stoppings and overcasts in mines.—Editor.*]

In view of the fact that a ventilating system is one of the chief items of expense, as well as an essential feature in mining coal, a few words along this line may be worthy of consideration.

The mining departments of coal-mining states are requiring that underground employees be carefully protected in their work; this is especially true in the matter of safeguarding men from gases, through the expulsion and dilution of all noxious atmospheres. It behooves the mine owner, therefore, when he spends his money for ventilating purposes, to study with care the probable future conditions, as well as those which now exist.

By the "Law of Diminishing Returns," after your maximum production is passed your cost goes up, and even though you allow your tracks to become impaired, your ditches to fill up and your tipple to rot, the ventilation must still be preserved in good condition as long as there are men digging coal. Then why not make the system of circulating air permanent in times of good tonnage and minimum cost?

How many mine operators figure in dollars and cents, the loss caused by leaky stoppings, doors and overcasts? It will pay any man to give this waste his attention and provide a remedy as quickly as possible.

Wood is the most common material used in building stoppings and doors. Even overcasts are frequently constructed of such material, although this practice is becoming less popular every day. However, with a permanent substitute approaching the cost of wood there is every reason to believe that the use of the latter will be entirely abandoned along the principa airways.

Perhaps no other material will continue more impervious to moisture, be less affected by atmospheric gases, show durability and fireproofing qualities better than the terra-cotta building block, if the block is made of the right ingredients and properly burned.

As a general rule, one man will erect a wood stopping in a ten-hour day, while it is safe to say that two men will put up a four-inch terra-cotta block stopping in at least seven hours, besides making a permanent job of the work. Why wouldn't this material be equally suited for overcasts?

Concrete is generally employed for such a purpose, but the structure is usually heavy and requires reinforcement, together with heavy building forms. However, the suggestion is made that if we insist on putting up our overcasts in concrete with a cinder aggregate; then by using one of the many metal fabrics on the market, we will erect a comparatively light and much cheaper structure.

The fact that a mine foreman uses all the old boiler tubes and scrap iron found around the mine for reinforcing his concrete does not stand as a criterion of economy. If he should stop to figure the cost in handling and shaping the necessary extra concrete to cover this junk and the heavy forms required to carry the weight, he might try some expanded metal or wire mesh in about four inches of cinder concrete and finish the job in one-half the former time.

Every mine has its own individual conditions, and our experiments must follow as circumstances present themselves, but the renewal of stoppings and overcasts is always preceded by a heavy loss of air through leakage, and a useless drag on the fan. Therefore, low first cost is not always the best cost, for it too often recoils as a boomerang.

A Water Tight Timber Shaft

By R. G. Johnson*

[To those interested in shaft sinking, we believe this article will prove of particular interest. So far as we are able to discover, this is the first coal pit ever sunk under a guarantee to produce a practically water-tight shaft. Cement is finding a wide application in shaft-sinking operations, and this is another example of the economy which may be effected by the intelligent use of this important construction material.—EDITOR.]

A description of a timber shaft, sunk through comparatively wet ground, under the rather unique guarantee of producing a practically dry shaft. This was successfully accomplished by forcing cement grout into the fissures carrying the water. When sinking through the strata thus treated was resumed the effectiveness of the method was readily perceptible.

*Engineer with the Dravo Contracting Co., Lewis Block, Pittsburgh, Penn.

On Mar. 4, the Pittsburgh Coal Co. let the contract for an air shaft for its Yough slope mine, near West Newton, Penn., with an entirely new feature added to the specifications. The agreement stipulated that the shaft must be practically dry when finished, and, as it was to be lined with timber, this precluded the method of grouting in behind a waterproof lining usually of concrete.

It was necessary, therefore, to seal off the water-bearing strata before the shaft was sunk through them and the method described in a recent issue of COAL AGE was used to a degree of success not thought possible. From streams of water which, it was estimated, would total between 80 and 100 gal. per min., the flow was cut to one-sixth gallon per minute.

PRELIMINARY WORK

Most of the coal company's engineers frankly doubted the practicability of the scheme when it appeared in the proposal of the contractor. It appealed to them as an experiment in the direction of economy, but when the actual saving in pumping costs was detailed in figures, it was deemed by them an advisable move to accept the proposal accompanied, as it was, by a guarantee.

Accordingly, on Apr. 1 sinking was commenced, and, in the first 10 ft. of earth, before rock was struck, springs running 15 gal. per min. were encountered. These could not be sealed off by the usual grouting methods since they were in the top soil; they were therefore left until the concrete coping wall was placed on the completion of the remainder of the job, when, by a system of channels and piping, they were successfully dammed from entrance into the shaft.

Sinking in the rock had gone only 15 or 18 ft. when the 6-ft. steel in the sump hole brought a stream of water which was forced out of the drill hole by the pressure of a body of gas. A stream the size of the drill hole would squirt out and rise a foot or two in height for a few moments, when the flow would cease with a rush of gas.

METHODS OF GROUTING

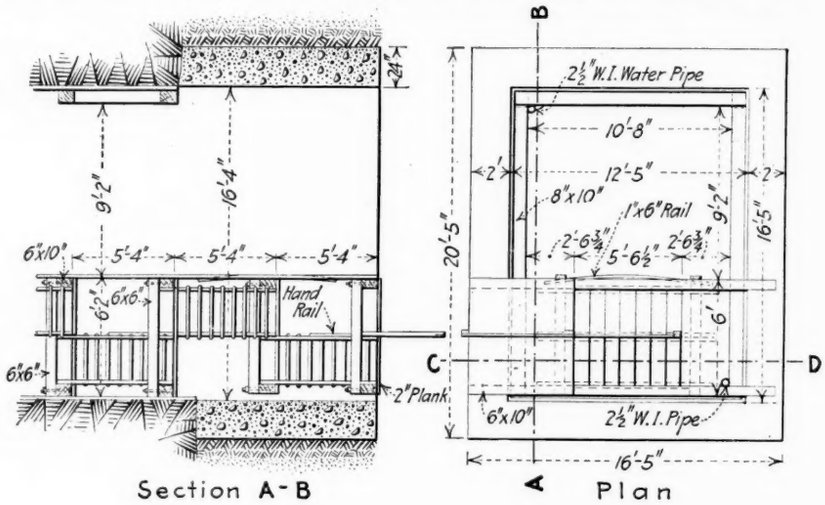
The holes were plugged, the grouting machines connected to a specially shaped nipple which was placed in the hole showing the most water and the grouting commenced. In a short time 39 sacks of cement mixed with the proper amount of water and stirred by the compressed air in the patented tanks, were forced in the crevices under high pressure.

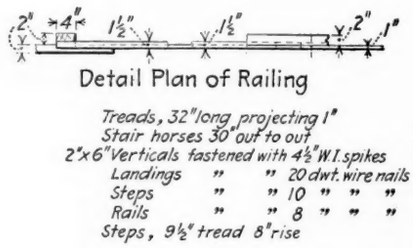
After a wait of 36 hours, the shaft was drilled again and the sump shot. The grouting had not only been successful in sealing off the water, but all trace of the gas was gone as well, and a solid white streak on the rib at one end and a part of both sides, not over a quarter of an inch thick, showed clearly where the water had once flowed.

About 85 cu.ft. of grout was forced in this one crevice, and assuming that the crevice was the same thickness in the vicinity of the shaft as it was at the shaft, a space of 3600 sq.ft. around the shaft was solidified by this one operation. This would seem to answer well the doubt in the minds of some as to whether the job, when once done, is a permanent one.

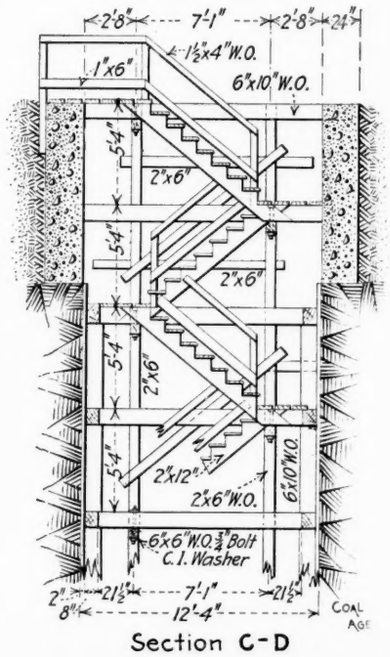
Certainly the water cannot penetrate such a barrier when the grout is forced into the smallest branches of the crevice under pressure. Specimens of grouted rock show tiny white lines where hair cracks have taken the grout and hardened cement could not break out of such places.

The process was used a number of times, and when the sinking was completed, the only water in the shaft was from the springs at the surface. In order




Detail Plan of Railing
Treads, 32" long projecting 1"
Stair horses 30° out to out
2"x6" Verticals fastened with 4½" W.I. spikes
Landings " " 20 dwt. wire nails
Steps " " 10 " " "
Rails " " 8 " " "
Steps, 9½" tread 8" rise

DETAILS OF TIMBERING THE PITTSBURGH COAL CO.'S YOUGH MINE SHAFT



to catch this, the coping foundation was carried about 5 ft. into the rock and the concrete started at this point. Drainage channels, formed by canvas and pipe, led the water to the interior of the shaft while the wall was being constructed.

Results Obtained

After the concrete had set about four days, the pipes were plugged and it was thought that the water was dammed out. But in a very short time it found its way down through the rock about 7 or 8 ft. below the top ledge, and out into the shaft. The plugs in the pipe-drainage channels in the walls were taken out and grout forced in under only 12 lb. pressure, for the span of the wall was too great to allow a load of any greater size. In a short time the water running into the shaft commenced to turn muddy and thick and soon ceased altogether. The fine penetrating cement grout had again done its work.

This cut the inflow down to 1¾ gal. per minute, all coming from two leaks in the concrete coping wall near the top. Examination showed dry honey-comb concrete, and when this had been treated with a liberal dose of thicker grout and mortar at the back of the wall, the flow was cut down to one-sixth of a gallon per minute.

The plans and specifications of the shaft are interesting only in that they are for the typical small air shaft in the Pittsburgh district—a combination ventilating and escape way. The only unusual feature of the specifications outside of the grouting process was the treating of all timber used in the shaft with a well known wood preservative, a feature well worth consideration.

The work was done by the Dravo Contracting Co., of Pittsburgh, under the direction of E. J. Taylor, chief engineer of the Pittsburgh Coal Company.

The Use of Telephones in Mines

By Gregory Brown*

Some practical suggestions supplementing Mr. Cole's article on "The Mine Telephone of Today," which appeared in the July 27 issue of Coal Age.

*Telephone expert, 463 West St., New York City.

I was very much interested in reading Mr. Cole's article on the subject of "The Mine Telephone of Today," appearing in your issue of July 27.

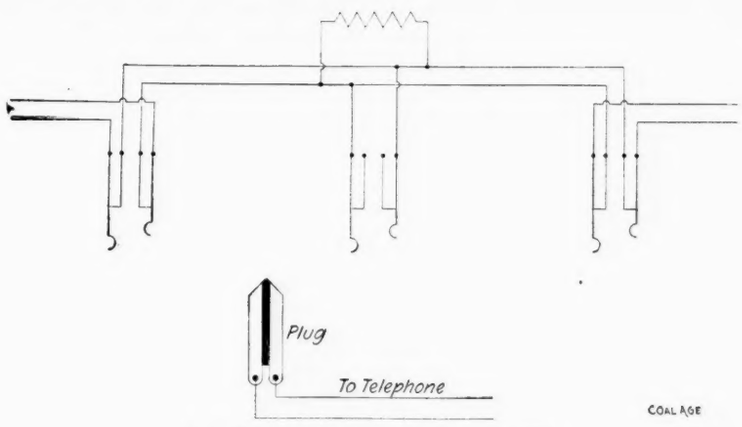
In view of the fact that telephone systems in mines represent a comparatively recent development, there is not very much information available concerning the best methods of wiring and maintaining a telephone system underground. The article by Mr. Cole is, therefore, I think, very timely, and it is to be hoped that his article will tend to bring forth the ideas and experiences of others who have telephone systems to install and maintain.

There are several points in Mr. Cole's paper with which I do not fully concur. In the matter of the circular loom cable, I notice that he states that in mines that are free from moisture it is good practice to install this type of cable. It has been my experience that this cable is particularly adaptable for use in mines where there is a great deal of moisture present. The fact that the cable is made up of twisted pair braided rubber covered wires renders it practically waterproof, and, as a matter of fact, I know of instances where the cable has laid under water for months at a time without being injuriously affected.

Cleats are very extensively used to support cable, but I do not see why the large spikes should be used when supporting the cable on the timber. I think it has been very general practice to fasten the cleats directly to the timbers rather than use a large spike and fasten the cleats to this spike.

In discussing the number of telephones which can be safely connected to any one line, I note that Mr. Cole indicates that eight instruments are about the maximum. The number of instruments which it is practicable to connect across one line is determined primarily by the number of ringers which can be rung by the generators at the different sets. Under ideal conditions, and with a particular type of set, as many as forty can be placed across the line and good ringing and talking will be secured. However, this would not be a safe figure to use in mine installations, on account of the fact that it is almost impossible to keep the line as free from leaks in a mine as it is above ground. I think that considerably more than eight telephones, as mentioned by Mr. Cole, can safely be connected across one line provided that the circuit is kept in good condition. As a matter of fact, I note that with the circuit arrangement shown, the three circuits are connected together through the jack box, which is the same as having all the sets across one pair of wires. In the installation which Mr. Cole described, this would make twenty-one sets across the line.

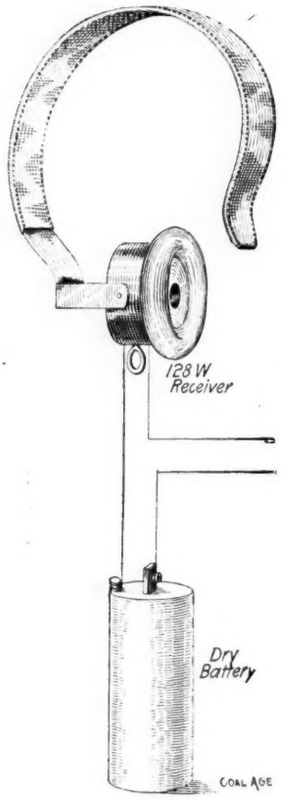
I note further that the author states that for mine work, four-bar generators have been adopted for use by some of the largest users with good results. Although it is undoubtedly true that there are quite a number of four-bar generator sets in use, yet I think during the last year or two but very few of this type have been put in. It seems to be advisable, in view of the severe conditions which surround the telephone line in the mine, to put in powerful five-bar generators in the set. These are standard with the principal manufacturers, and they will ring more bells than the four-bar type, and will ring just as many bells under considerably worse conditions than the four-bar type.



A Common Jack-box Arrangement

Mr. Cole's statement regarding the object of the automatic switch hook does not seem to me to quite cover the case. When the receiver is on the hook the talking circuit is cut out and the ringing circuit is across the line. When the receiver is taken off the hook, the talking circuit is cut in, but the ringer circuit is not cut out. It is merely shunted by the receiver and one winding of the induction

coil. It would be a considerable disadvantage if the ringing circuit were cut out when the receiver was off the hook; in fact, one of the manufacturers provides a condenser in the set which reduces the shunting effect of the talking circuit when the receiver is off the hook. Without the use of the condenser, if a man should leave the receiver off the hook, it would interfere seriously with the ringing of the bell in that set and most of the sets on the line, but by using a condenser in series with the receiver the fact that the receiver is left off the hook will not prevent the ringing of the bells to anywhere near as great an extent.



APPARATUS FOR LOCATING TELEPHONE TROUBLES

Fig. 8 shows a diagram which I think is somewhat misleading. The circuit shown would indicate that all of the jacks are electrically connected. If this were the case, there would be no use for more than one jack, which would be used merely to connect the telephone to all the wires of the system. The jack arrangement shown in the attached sketch is one that been extensively used. It will be seen that when the plug is inserted in either one of the outside jacks, it connects the telephone to the line coming in at that point, and through the inside contacts breaks the connection with the line entering from the opposite end. If the plug is inserted in the middle jack the set is connected to both lines. The testing circuit shown in figure 10 can be simplified somewhat by merely using a head-band receiver and battery, as shown in attached sketch, Fig. 2. If there is trouble in the telephone instrument, the electrician places this receiver on his head, sticks a dry cell in his pocket and touches the two wires to different points in the wiring of the telephone set. For instance, if he suspected that a ringer coil was open, by touching the two terminals he either would or would not hear a click in his receiver. If he did hear a click, it would, of course, indicate that the circuit was complete through the ringers, and if no click is heard, he would know that there existed an "open."

Safety Lamps and Firedamp*

At the meeting of the Manchester Geological and Mining Society, on Dec. 13, G. H. Winstanley, lecturer in mining at the Manchester University, gave a paper on "The Safety Lamp as an Instrument for the Detection and Estimation of Firedamp in Mines."

Mr. Winstanley expressed the view that the ordinary safety lamp without elaboration of any kind, will continue to be the most popular and the most generally useful appliance, especially in the hands of the colliery fireman, for detecting the presence and estimating the amount of firedamp in the mine atmosphere. After considerable investigation and experiment, he is confirmed in that opinion and also in the view that in the hands of a properly trained operator the safety lamp is capable not only of detecting the presence of relatively small percentages of gas, but of affording reasonably accurate information in regard to the amount of gas present. He is also led to the conclusion that the whole question is one that is too little understood, even by those who might be expected to be fairly familiar with the subject.

The capacity of the safety lamp to detect and estimate gas does not depend alone on the lamp or the kind of oil it burns, but chiefly on the skill of the observer. The mere possession of a safety lamp does not give the user the power of detecting and estimating the presence of gas, irrespective of his ability to use the lamp intelligently as a means to that end. In the hands of one man the lamp is merely a source of light; while in the hands of another properly trained person, it becomes a scientific instrument capable of giving fairly accurate results.

It has been suggested by some investigators, who have recognized the fact that the size of the cap is seriously affected by the size of the testing flame, that, in order to rely upon the size of the cap as an indication of the percentage of gas present, a standard size of testing flame must be adopted. In Mr. Winstanley's opinion it would be unreasonable to expect the ordinary colliery fireman, carrying out in the regular way his daily inspections, to adjust the size of his testing flame, each time, accurately to within one hundredth of an inch of a standard height. Yet, it has been claimed that a variation to this extent makes quite a considerable difference in the height of the cap. It may be asked, then, "Can the height of the cap be relied on to determine correctly the percentage of gas present; and, if not, how can the safety lamp be used as a means of estimating the gas present?" In order to solve this question, Mr. Winstanley secured some photographs, all taken with the same lamp, and as a result has arrived at the following conclusions:

(1). The height of the cap, with a given lamp burning a given oil, does not depend alone or chiefly on the percentage of gas present, but is governed largely by the size of the testing flame.

(2). Even when the percentage of gas falls as low as 1½ or 2 per cent., quite a large cap is produced if the testing flame is drawn down till there remains only a small, white apex visible, although these caps are very delicate and not easily seen.

(3). The density of the cap (its visibility) is a more reliable indication of the percentage of gas present than the height of the cap; and in order to estimate correctly the percentage of gas from the appearance of the cap, one must be familiar with all the variations in height and degree of visibility possible with different percentages of gas and different sizes of testing flames.

(4). When more than 3 per cent. of gas is present, the growth of the cap, owing to the increasing size of the testing flame, is more rapid than with lower percentages of gas. With a large testing flame the caps produced by 3 per cent. of gas or less rapidly become invisible; but those caps produced by more than 3 per cent. of gas remain visible even when using a relatively large testing flame.

NECESSITY FOR EXERCISING CARE

Dealing with the necessity for exercising care in testing for gas, Mr. Winstanley pointed out that the operation of testing for gas is not unattended with danger; and proved by a simple experiment that a coal-dust explosion may be initiated by the act of testing, if, by chance, the lamp used was defective. He adds: "There is much misplaced confidence in the so-called 'safety lamp.' Official returns show there are, in regular use in British collieries, about 700,000 safety lamps. Of this number, however, more than half have but one gauze, which is almost equivalent to disqualifying them for use as safety lamps. There is no 'permitted list' of safety lamps, nor are such lamps required to be tested. The result is that many mere imitations of safety lamps are taken into the mines, which are both faulty in design and workmanship.

*Special Correspondence, Wigan, England.

"However well ventilated a mine may be, it is common to find, from time to time, 'pot holes' and other cavities in the roof, which are more or less screened from the air current and become lurking places for firedamp that may appear to be persistent and not easily removed. In such a case, the fact is that as rapidly as the gas diffuses into the surrounding atmosphere, other gas is given off that takes its place and keeps the cavity full. It is this circumstance that gives rise to the popular but erroneous (?) impression that if undisturbed, the light firedamp will ascend to the highest accessible place and remain there.

The fireman may have such a cavity under close observation, and, as a matter of fact, the amount of gas it contains may of itself be insignificant and quite incapable of producing serious consequences. In a dry and dusty mine, however, every circumstance directly or indirectly relating to ignition and combustion must be regarded as a possible source of trouble and danger."

In concluding, Mr. Winstanley urges the importance of the *individual training* of all firemen and other colliery officials whose duties require that they should be able not only to detect the presence but also to estimate the amount, of firedamp present in the atmosphere.

Size of Coal Pillars

The dimensions of coal pillars to support the roof of a seam without the coal being crushed, should follow a definite law. Tabe found from experience that a very simple and successful formula is an allowance of 10 sq.yd. of pillar for every fathom of cover. By making it more, no danger will arise, but he agreed that it may entail expense in working and cause defects in the ventilation. On the other hand, any decrease may result in a squeeze. To find the side dimensions of square pillars by this rule, multiply the depth of the seam in fathoms by 10 and extract the square root of the product. Thus the size of pillar for 250 fathoms would be $\sqrt{10 \times 250} = 15.8$ *yd.*

Correction

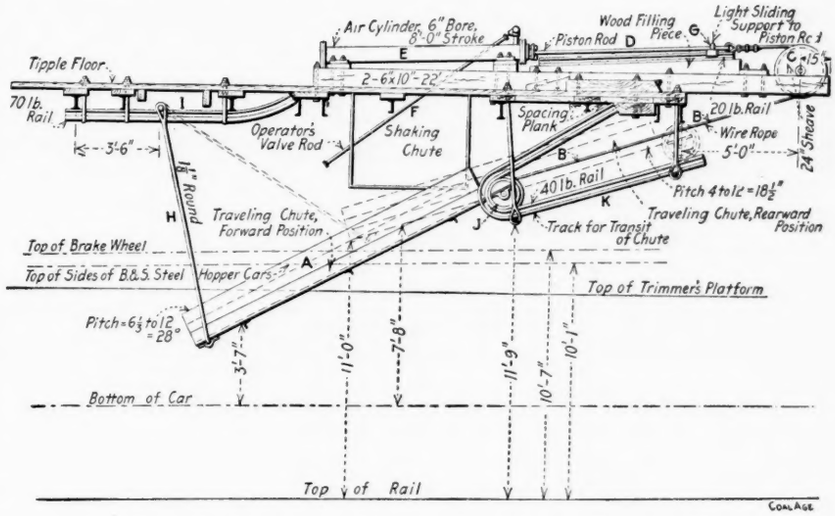
Attention has been called to the fact that in speaking of the different types of mine telephones in the article on "The Mine Telephone of Today," COAL AGE, July 27, p. 108, the impression is given that any wooden telephone inclosed in an iron box is "ironclad." What is called "the ironclad type" of mine phone is a phone of special manufacture. This type of phone has been designed specially for mine use. An ordinary wooden telephone inclosed in an iron box could not be classed with the ironclad type mentioned in the article to which we have referred.

A Low Delivery Coal Chute

The accompanying illustration shows a method adopted at Sagamore Mines, Indiana County, Penn., to reduce coal breakage. The increased depth of railroad coal cars has made it necessary to arrange some means by which the coal can be lowered below the level of the tops of the gondolas before being discharged from the end of the chute. The breakage today is no longer so much from the violence in the tipple pans as from the fall into the bottoms and hoppers of the "battleships." In the Sagamore tipple, shaking chutes are arranged and they permit the coal to pass without momentum or breakage to the point of discharge, but do not insure whole coal in the car.

THE CHUTE IS LOWERED INTO CAR

The new appliance consists of a pan which dumps longitudinally, and which



A CHUTE WHICH SLIDES COAL INTO THE BOTTOM OF THE CAR

can be allowed to pass forward and downward so that the coal has a minimum fall. The motion of the pan (A) is regulated as will be seen by a wire rope (BB) passing round a pulley (C). This rope is attached to a piston rod (D) and is actuated by air admitted to the cylinder by the movement of the handle (F). This handle is within easy reach of the trimmer when on his platform.

The piston is compelled to travel in a straight line by a block (G) which slides back and forth on a 20-lb. rail. The pan is supported at its front end by a swinging rod (H) attached to a 70-lb. rail affixed to the tipple floor.

The rear end of the pan rests on a wheel (J) which travels back and forth on a 40-lb. rail (K) when pulled by the wire rope or by the action of gravity. The distance of the point of discharge from the car bottom is only 30 inches.

The appliance was invented by C. D. Oldknow, chief engineer of the Buffalo and Susquehanna Coal and Coke Co., the company owning and operating the Sagamore mines.

Developments in Kentucky

The Consolidation Coal Co., which has four mines in Johnson County, Kentucky, is pushing the work incidental to the opening up of its new properties. These are in Pike and Letcher Counties. This company has built two model towns for its workmen so far and announces that it will now build another on the Main Boone, below the mouth of Potter's Fork and along the line of the Lexington & Eastern R.R. In addition to the Consolidation Coal Co., other concerns which have large holdings in the eastern and northeastern coal fields are as follows: The Beaver Creek Coal Co., with 100,000 acres in Floyd and Knott Counties; the Kentland Coal Co., with 85,000 acres in Pike County; the Northern Coal & Coke Co., with 175,000 acres in Perry, Leslie, Floyd, Knott and Pike Counties; the Kentucky River Consolidated Coal & Coke Co., with 40,000 acres in Knott, Leslie and Perry Counties, and the Haly Coal Co. with 35,000 acres in Knott and Perry Counties.

There is often a question as to which of two ropes has the longer life, the one coming off the top of the winding drum or the one off the underside. The generally accepted answer is in favor of the top rope, as it bends only in one direction, whereas the lower bends first one way and then the other. Baird says that so far as his experience goes the difference, if any, is not pronounced. He also believes that a rope running on a wood-lined drum lasts longer than one on wire or steel.

Coal Mine Ventilating Equipment

By W. M. Weigel*

Effect of shape of blades and design of casing and stack on the performance of a fan. Fan testing. Measurement of power and of the pressure and volume of the air. Faults of anemometers. Eighth of a series of articles on mechanical ventilators.

*Associate professor of mining, Pennsylvania State College, State College, Penn.

It was formerly considered that the shape of the blades had little or no effect on the action of a fan. Recent investigation and experiment, however, have shown that the curvature and position of the blades have a very important influence on both the pressure developed and the mechanical efficiency. Theoretically, for a given peripheral speed the velocity of efflux, and consequently the pressure, increases with the forward curvature of the tips of the blades.

The increase in mechanical efficiency due to a radial position of the blade tips as compared with an inclination backward from the direction of rotation is shown conclusively by comparing the efficiency curves of fans which are otherwise identical. Further, the high efficiencies attained by fans of the multi-vane form, which all have the blades curved forward at the outer extremity, indicate that the inclination forward of a radial position gives increased efficiency.

Difference of Opinion Regarding Shape of Blades at Inner End

There seems to be a greater difference of opinion in regard to the shape of the inner ends of the blades. In at least one modern fan, showing a high efficiency, tangents to the inner ends of the blades incline backward from the direction of rotation, while in most of the other modern types such tangents incline forward, following more closely the theory that the blades should here be tangent to the resultant of the radial velocity of the entering air and the velocity of the blade, to prevent loss of power by impact.

In all the fans having the blade tips curved forward, the blades are shaped to the arc of a circle, this being the form most easily constructed. The radius of the arc varies from a maximum of ⅗ of the radius of the wheel to a minimum of ¼ of the radius of the wheel. The relative inclination of the inner and outer ends, then, depends on the location of the center of the arc. In fans of large diameter with blades which for the most part lie in a radial plane, the inner ends of the blades are curved forward.

Just what effect is produced by blades which extend into the inlet space or by scoop-shaped blades, projecting beyond the fan inlet, is a matter of personal opinion and there is room for careful investigation along these lines.

The influence of the radial length of the blades is still largely an unsettled question. We have records of tests of fans with both long and short blades, all showing high efficiencies. Relatively large inlets with consequently short blades would apparently offer less resistance to the air and hence be best suited to high velocities. As previously stated, short-bladed fans or those with relatively large inlets give their best efficiencies when the velocity pressure is high as compared to the total pressure, while the opposite condition holds true for fans with small inlets or long blades.

The distance apart of fan blades at the circumference of the wheel is made approximately equal to their radial length. With fans having auxiliary blades interposed between the main blades, the distance apart of these latter is greater than their radial length. This relation holds true for all fans, and so those with short blades have a correspondingly greater number.

There is nothing to be gained by making the fan wider than is necessary for the cylindrical surface of the inlet space to be equal to the area of the inlet opening, after making due allowance for resistance to the entrance of air. A greater width will cause a falling off in efficiency and capacity.

Marked Effect of Shape of Casing on Efficiency and Capacity

The effect of the shape of the casing is quite marked. The tendency of modern practice is to increase the radius of the spiral more rapidly than was previously thought necessary, thus giving a greater throat area. This decreases the fan resistance and increases the efficiency and capacity of the fan without lowering the pressure developed. Small high-speed fans have a more rapidly increasing spiral than those of large diameter running at slower rotative speeds. Such authorities as J. T. Beard and R. V. Norris* give for the expansion, or radial dimension of the outlet at the point of cutoff, the formula

$$E = \frac{Q}{\pi D n l}$$

in which

E = Expansion at cutoff, in ft.
Q = Quantity of air in cu.ft. per min.
n = Number of revolutions per min.
l = Width of the blades or fan wheel.

*Trans., A. I. M. E., Vol. 35, page 457.

This dimension is intended to give a velocity of the air at the point of cutoff, equal to the velocity of the blade tips, but Mr. Norris further recommends increasing E by 20 per cent. of the value given by the formula, in order to allow for the slowing of the air in the casing. The foregoing method of figuring will probably give sufficient area for fans of low volumetric efficiency, say 100 to 150 per cent., but for fans delivering greater volumes, the outside radius of the spiral at the point of cutoff should be increased still further. When fans are intended to operate at high pressures the beginning of the spiral casing should start as close to the circumference of the wheel as practical conditions of clearance will allow.

The *evasé* chimney in exhaust fans is a continuation of the casing which is intended to slow down the air gradually before discharging it into the atmosphere. Theoretically, the velocity of discharge into the outside air should be zero to prevent loss of pressure and power. Actually, such a condition is impossible, an area at the top of the chimney of from two to four times that at the cutoff being about as much as can be attained in practice.

With blowing fans, the discharge is connected directly to the fan drift. The area of the fan drift is often larger than the area of the discharge opening of the fan. The increase in size should be made gradually, especially if the air velocity is high, in order to prevent loss of power. The velocity of the air in the fan drift usually varies from 1200 to 2500 ft. per min. Higher velocities should be avoided by enlarging the area of the drift.

Fan Testing

Mine fans should be purchased under a guarantee that they will have a certain mechanical efficiency when operating at a given static pressure and delivering a stated volume of air per minute. The pressure and volume required are determined by the conditions of the mine; and when furnished with these data, the manufacturer is then in a position to submit his proposal.

When installed, the fan should be tested to see if it comes up to the requirements. The proper testing of a mine fan requires considerable care and ability if accurate results are to be expected, the conditions at the mine making such work more difficult than when the fan is set up on the testing floor of the factory.

If the same maker furnishes the engine, as well as the fan proper, then the efficiency guarantee will usually cover the complete equipment, which simplifies matters to some extent.

Measurement of three quantities is necessary: First, the power delivered to the fan; second, the static pressure produced, and third, the volume of air delivered. It is necessary that these different quantities be measured simultaneously. Each test should be conducted during a period of from 10 to 15 minutes, the various readings being taken at intervals of several minutes.

Measurement of Power

If the fan is engine driven, the power delivered to it may be determined by taking indicator cards of the engine and deducting from the indicated horsepower an allowance for the engine losses. If the duration of the test is to be ten minutes, three cards from each end of the cylinder would be sufficient: one at the beginning of the test, one five minutes later and one at the end. If the test is to extend over a longer period, then cards should be taken at five-minute intervals. Two observers are required for this work, one to take the cards and one to mark and record them. Another observer will be required to note the revolutions of the fan and engine.

If the fan is motor driven, then the power delivered to the motor may be measured by an indicating wattmeter or voltmeter and ammeter; and the power actually consumed by the fan may then be calculated by allowing for the assumed or previously determined efficiency of the operating unit. The measurement of power must be intrusted to someone familiar with this sort of work.

Measurement of Air Pressure Important

The correct measurement of the air pressure developed is an important and difficult matter. The pressure should be measured close to the fan. At this point the variation in velocity over the area of the inlet or outlet is great and there are liable to be many eddy, or cross-currents. The action of any of these must be guarded against. On account of the eddies and the variation in velocity, it is impossible to obtain readings of the velocity pressure by means of the Pitot tube at this point. However, the static pressure can be obtained with fair accuracy by taking reasonable precautions.

Some authorities recommend locating the end of the test or pressure tube near the center of the fan or at the inner end of the fan shaft in the case of an exhaust fan. The tube may be protected from the effects of impact and eddy currents by putting a plug of wool in the end of the pipe and covering with a cap of heavy flannel. The pipe should be without bends of any kind and should be held in a position normal to the direction of the air current.

As the true static pressure is the same in all portions of the fan drift near the fan inlet or outlet, as the case may be, a better way to avoid the effect of air currents is to provide a small auxiliary air chamber, say 8x10 in. in dimensions, outside of the fan drift and connected with it by one or two small openings. This small chamber should be placed on that part of the roof or sides of the fan drift which is least exposed to the direct force of the current of air, and since the connecting openings will be made flush with the inner surface of the drift, the velocity pressure will not be transmitted to the interior of the pressure box. The tube connecting with the manometer is then fitted into this chamber and the space around the tube packed to prevent the escape of air.

This arrangement will tend to reduce the oscillations of the water column and make readings easier. The scale of the water gage should be graduated to hundredths of an inch; it is impossible to read any closer. If desired, a lighter liquid than water may be employed, such as gasoline or alcohol, giving greater scale readings for the same pressure, the readings being reduced to the equivalent water column after carefully determining the specific gravity of the liquid used. Other forms of pressure gages are obtainable which are more easily read than the water manometer and may be conveniently employed if their accuracy is checked against a column of pure water.

It is best to have two observers at the manometer, one to take the readings and one to record, so that they may check each other. The temperature of the air as determined by the dry- and wet-bulb thermometer and the barometric pressure must also be recorded. One reading is sufficient.

Measurement of Volume of Air

The volume of air passing is determined by measuring its velocity at a point of known cross-sectional area. This velocity may be measured in two ways: First, by the anemometer and, second, by the Pitot tube.

The special conditions affecting mine-fan installations more often than not make impossible the use of the Pitot tube, which is the more accurate method. As is well known, anemometer readings are often inaccurate. These instruments usually must be tested or standardized and a correction coefficient determined by which their readings are reduced to actual velocities. This correction factor, however, may not be a constant at all velocities even within a limited range of, say, from 1500 ft. to 2500 ft. per min. Moreover, the personal equation of the observer enters into the matter, as he must start and stop the recording gear of the anemometer by reference to a watch; and a second's error in the time of starting and stopping may introduce a serious error into the calculations.

Assuming that an anemometer is to be employed and has been standardized for approximately the velocities that will be measured, the place at which the readings are to be made must be selected. For the best results, this should be in a straight airway of uniform section, free from bends and irregularities on each side of the place of measurement for a distance of from 8 to 10 diameters of the airway. Such a requirement makes it impossible to take the air measurement in a fan drift on the surface, unless the fan is at a considerable distance from the mine entrance or mouth of the air shaft.

Main Airway Usually Best Place to Measure Volume

The best place then will usually be found in the main airway within the mine. If there is only one main airway, the dimensions of the point selected must be measured carefully and the area divided into 12 to 20 rectangles of as nearly equal area as possible by fine wires stretched from side to side and from roof to floor. The observers should be stationed outside the airway, as, for instance, in a crosscut, the entrance to which from the airway is closed by a light brattice.

To measure the velocity of the air, the anemometer is held by means of a long rod for a certain number of seconds in the center of each area formed by the cross wires, then moved to the next for an equal number of seconds and so on. The total reading gives the average velocity over the whole airway when reduced to the time of one minute. Supposing there were 16 rectangles and the time of the test was 10 min., then starting one-half minute after the beginning of the test, the anemometer would be held 15 sec. in each space, requiring 4 min. for the total reading. Again, after an interval of one minute, a second reading would be started, ending one-half minute before the end of the test. This would give two average readings, which would check closely. Readings of the wet- and dry-bulb thermometer should be recorded at the place of air measurement so that the volume at this point can be reduced to the equivalent volume at the temperature of the fan.

If the air is divided at the foot of the shaft into two or more splits, then the above measurements must be taken in each split. If the air shaft is unobstructed, there is no reason why the air measurements should not be made in it at a sufficient distance (8 to 10 diameters) below the surface. Usually, however, there is no place to station the observers out of the way of the air current unless they are located in a separate compartment and work through an opening in the partition, this opening being closed around the anemometer rod by means of brattice cloth.

Impossible to Get Accurate Velocity Readings in Fan Drift or Chimney

Fans are sometimes tested by closing the mine opening and allowing the proper amount of air to pass through the fan by adjusting the explosion doors. Such a method is convenient, but requires the measurement of the air in the fan drift or chimney where, as previously noted, there is a great variation in the velocity at different points of the cross-sectional area, which cannot be averaged even fairly well by taking readings for a large number of rectangles. In fact, in such a case it is possible even to get negative readings, showing excessive eddying of the air.*

In the rare instances in which the airway where measurements are taken is circular, instead of dividing the area into rectangles, the readings may be taken at the middle of concentric annular areas. The velocity for each concentric area must be read separately, and the corresponding volume calculated, the sum of the different volumes giving the total amount of air passing. Or, the total section may be considered as divided into imaginary concentric rings of equal area and the radius to the middle of each ring calculated. The differences between these radii and the radius of the outer circumference, if laid off on the rod supporting the anemometer, then afford a gage for placing this instrument at the correct distance from the circumference. Moreover, by holding the anemometer for an equal length of time at each radial distance, the average of the cumulative reading may be taken as the average over the whole area.

If velocity measurements are obtained by means of the Pitot tube, the same requirements regarding the place of measurement must be adhered to, and the area divided into equal rectangles, as before. To determine the static pressure at this point would be of no value, for it would show merely the difference in pressure between the intake and return airways and would not give the pressure developed at the fan. For this reason the double-tube type of instrument with impact and pressure pipes connected respectively to the two legs of the gage is the only suitable device. From it the velocity pressure may be read direct, regardless of whether the place of measurement is above or below atmospheric pressure, or in the intake or return airway. Moreover, the gage does not have to be separated from the Pitot tube by a partition, but may be kept in the same atmosphere as the area of measurement because both its ends are closed.

Taking Observations and Readings

When all arrangements have been made for the test, and the duties of each assistant explained, the time of beginning and ending each run is decided upon, and the various observers set their watches in unison so that all readings may be made simultaneously. To avoid errors, tabulated forms should be provided for recording the various observations.

The speed of the fan is then regulated until the desired pressure *at the fan* is obtained as nearly as possible and the readings begun. Further adjustment of the pressure may be made by placing a regulator beyond the point of air measurement or by opening or closing doors. The mine, of course, must be idle during the test. At least one test should then be made with the pressure 20 to 30 per cent. greater than the normal and one with it 20 to 30 per cent. below normal.

The data obtained from the three or more tests are then worked up, giving the mechanical efficiency, the pressure or depression at the fan and the volume of air passing under the several conditions. If desired, the results may be plotted, and curves drawn through the points, showing graphically the variation of the three values under different conditions.

In calculating the useful work done on the air, the velocity pressure at the fan inlet or discharge must be determined by the method previously explained and the sum of this and the static pressure at the same point taken as the total pressure of the air. It may happen that better efficiencies are obtained at pressures or volumes different from that stated in the guarantee. The important consideration, however, is that it comes within the guarantee when operating under the stated conditions, and that the required volume of air is caused to circulate through the mine.

Corrections May Be Made within a Small Range of Variation

It may be difficult to obtain exactly the pressure desired, in which case the observed readings may be corrected within small ranges of speed, pressure, volume and power, for a constant resistance, according to the principle that the volume varies directly as the speed of rotation; the pressure as the square of the speed of rotation; and the power as the cube of the volume or speed. By making these adjustments, the power, pressure and volume under the required conditions may be obtained.

The importance of knowing the range of efficiency when operating at pressures and capacities above and below those for which the fan is rated, is evident when it is remembered that the fan may have to operate at a different speed than that for which it was designed, because this speed is usually based on the *calculated* resistance of the mine, and this will change with variations in the coefficient of friction in the airways, irregularities in their size, frequency of bends, etc.

*Engineering and Mining Journal, Vol. 83, page 1008. "Practical Experiments in Coal Mine Ventilation," by John B. Thomson.

Protective Coating for Mine Pipe

The difficulty of protecting mine pipe from the action of acid mine water, and the consequent cost of maintenance, are familiar subjects to mine managers and operators. It has come to be accepted, as a matter of course, that any pipe will have a short life in the average mine service, and that renewals are as inevitable as the proverbial, "death and taxes."

It is a well-known fact that any ordinary metal exposed to mine water is subject more or less to corrosion. Methods of protection, therefore, consist in giving the pipe some covering which shall keep water from the surface of the metal. Theoretically this may not be a difficult proposition, but in mine practice, where careless handling, falls of rock, overturned cars, and other contingencies must be considered, the problem is not an easy one.

The Abendroth & Root Manufacturing Co., of New York, has given considerable attention to this question in connection with its spiral riveted pipe for coal and metal mines. This pipe is serviceable for water supply, drainage, ventilation, compressed-air transmission, and similar service which involves more or less exposure to the action of mine water.

This pipe is built up of heavily riveted steel strips, thereby insuring rigidity and pressure-resisting capacity. After the pipe has been provided with the necessary fittings, it is given a severe hydraulic test.

It is then thoroughly cleaned and plunged into a tank of molten asphaltum which is kept at a temperature of 400 deg. F., where it remains until the metal has obtained the temperature of the bath, so that the asphaltum penetrates every crack, crevice and pore. The coating thus becomes an integral part of the pipe. After immersion for the proper time, the pipe is hoisted and hung vertically. Much of the asphaltum runs off, but the cooling is sufficiently rapid to retain a thickness of about 3-32 in. over both inside and outside surfaces.

This coating will not run at any temperature below 400 deg. F., and does not become brittle at any temperature ordinarily found in the mines. It will not crack, chip or peel, and is sufficiently viscous to give under a blow which may bend the pipe. Nothing but deliberate abuse can injure this coating and destroy its usefulness. Flanges, side outlets and separate fittings can be coated in the same way, either before or after attaching to the pipe.

Where the pitch of coal to be mined exceeds 20 deg., haulage is a serious problem. In many instances sheet-iron chutes for bringing the coal to the entries have proved the best solution of the problem.

New British Coal Washing Plant

Foreign Correspondence

A plant erected in 1911 shows that the English washers are still built on the pulsating jig pattern, with the use of feldspar to aid separation of the smaller sizes. The use of cast iron for tanks and jigs assures their permanence under severe conditions of use.

The Cramlington Coal Co., Ltd., with headquarters at Newcastle-on-Tyne, has several collieries in Northumberland County, England, including the Amelia, Scott, Daisy, Lamb, Betsy, Ann, Wrighton and Dudley. The washing plant constructed by Messrs. Campbell, Binnie, Read & Co., of Hamilton, England, is installed at the Lamb colliery, but coal is brought to these washers from all the other shafts, the Lamb operation being the most centrally situated. The coal is brought in by hopper-bottom cars. At the washery there is a receptacle arranged below the rail level which has a capacity of about 40 tons. Into this the contents of the cars are emptied. In order to provide for automatic discharge from this storage the bottom of the receptacle is hopper shaped and the coal empties itself into a bucket elevator which passes the coal into the washing plant proper.

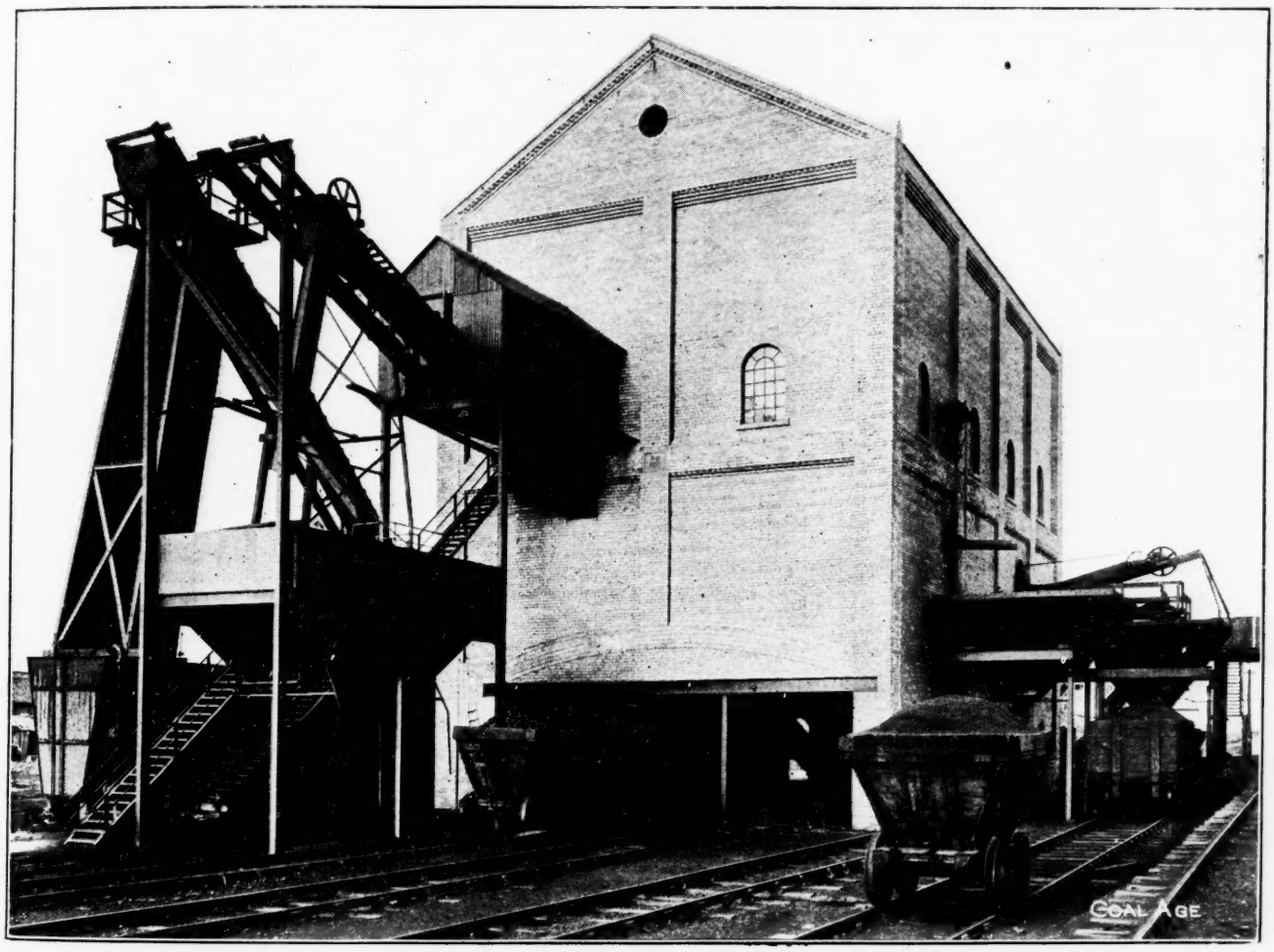


FIG. 1. THE WASHER AT THE LAMB COLLIERY, NORTHUMBERLAND, ENGLAND

WASHING LARGE COAL

When the coal arrives at the top of the elevator it is delivered into a set of jigging screens six feet wide. No special description of these is necessary, as they are of the usual type and the coal is classified by means of those screens into suitable sizes for washing. All coal which passes over ½-in. mesh goes to the common jigs and all the finer material which goes through ½-in. mesh passes to the fieldspar jigs. Six of these latter are installed, the tanks being made of cast-iron plates bolted together and made water tight.

Great care has been taken by the makers to render the action of these washers as automatic as possible, and that this has been effectively done is shown by the fact that when the valves have been set to suit the quantity of coal to be washed the only attention required beyond the usual maintenance work such as oiling, etc., is the operation of the sludge doors two or three times an hour. Adjustable eccentrics are provided to operate the plunger, so that the stroke can be altered from zero to 4½ in. and the bearing surfaces are kept oiled by a self oiling device.

SEPARATING THE FINE COAL

From these tanks the washed coal is delivered with the overflow water into a second set of jigging screens, where the water and any pea and "gum" (the finest coal or sludge) which may be contained in it are drained off, the nut coal being classified into market sizes. There are three sizes of coal made, known as "trebles," "doubles" and "singles."

Trebles are delivered direct by means of a chute into cars while the remaining sizes are delivered into separate bins, each of 15 tons capacity. For washing the pea and sludge eighteen Campbell-Binnie feldspar tanks have been fitted up. These are of the latest design and are arranged in three batteries of six each, formed of cast iron plates bolted together.

The eccentrics are adjustable and the meshed screens carrying the feldspar beds are bolted to cast iron frames, so arranged that repairs can easily be made. The action of these tanks, like that of the ordinary jigs is entirely automatic. The unwashed coal and the washing water enter at the back of the battery of jigs. They pass over three beds of feldspar and the shale and other foreign matter which have a greater specific gravity than that of such coal as it is desired to save is thereby separated and drops through the feldspar beds. The clean coal and water passes out at the front of the battery. The agitation of the water is greater at the entering end than at the discharge, this agitation being graduated in each of the three beds by adjustable eccentrics.

Draining the Washed Coal

From the feldspar jigs the washed coal is carried along with the overflow water into a recovery apparatus. This consists of a scraper type conveyor having a perforated bottom which permits the water and fine "gum" to separate from the pea. The gum passes through the perforations into pipes which carry it to the fine "gum" recovery plant, while the pea is conveyed by the scraper to the delivery end of the conveyor and delivered into a bin over the railroad switch.

The fine gum or sludge recovery plant consists of a dredging elevator working in a cast iron tank 60 ft. long by 11 ft. deep. The elevator travels at a slow speed and is fitted with perforated buckets so that the water is given time to drain off. When this is accomplished the recovered gum is delivered by means of a chute into a bin placed over the railroad.

The considerable volume of water required for the working is circulated through the plant by means of a centrifugal pump made by the Pulsometer Co. This is driven by belting from the main electric motor. The washed nut and pea are cleansed by a spray supplied with fresh water by a force pump driven from the main motor.

Disposal of Waste

The refuse from the ordinary and feldspar jigs is collected and led by means of pipes into the casing of an elevator conveyor of the bent link scraper type, and is enclosed in a water-tight casing which extends above the level of the water in the jigs, the conveyor itself being extended upwards so that the water may have opportunity to drain off. The refuse is then delivered into a bin over the railroad.

As hinted above, electric power is used to operate this plant, the main unit being a Scott-Mountain 200 b.hp. three-phase slipping motor which utilizes a current of 2750 volts and runs at 350 r.p.m. The fine-coal recovery plant and the refuse conveyors are driven by two 12 b.hp. Holmes motors.

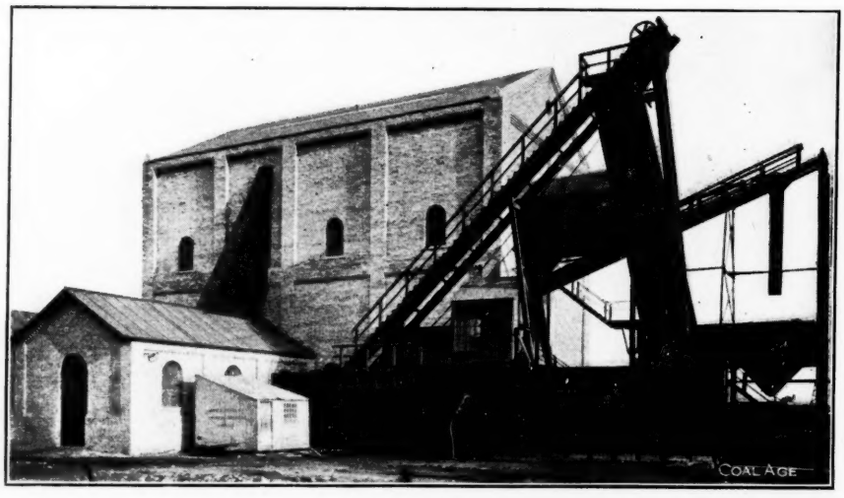


Fig. 2. Side View of Same Washer

Figs. 1 and 2 give a general view of the building in which this series of operations is effected. Owing to the fact that the main machinery is all arranged on one and the same level the washery attendants have all the important working parts constantly under their immediate supervision.

Moreover, all repairs will be made under favoring conditions because ample room has been allowed and the machinery is easily accessible. The main structure was built by the colliery company itself and is of a permanent character. The outer walls consist of brick and cement; the roof is trussed with steel and the machinery is carried by heavy steel girders.

The washing converts all the classes of coal treated from a comparatively inferior fuel into one which has all the qualities of a first class Northumberland steam coal, while the sizes obtained render it a most suitable fuel for modern boiler appliances and gas producers.

Some System

At a certain coal mine in New Mexico, says *Railway and Locomotive Engineering*, the superintendent was annoyed, from time to time, by employees moving into and out of the company's houses without due notification of their frequent changes. It became impossible to keep the rent accounts straight on the office books, and finally the superintendent resolved upon stringent measures. He posted the following notice, which is given verbatim—orthography, syntax and all:

february the 11th.

Notice to all employes

aney Person or Persons that Mooves into A house Without My Consent shall be Put out Without anney Cemmony.

Dam it I Must and Will have some Sistom.

[Signed],
Hen Filster.

Death Rate in American Coal Mines

The following figures derived from the Bureau of Mines show the irregular movement of the death loss in American coal mines since 1907:

DEATHS FROM MINE ACCIDENTS IN UNITED STATES

Year..	Total Deaths	Deaths per 1000 employed
1907.....	3197	4.86
1908.....	2451	3.60
1909.....	2412	3.62
1910.....	2834	3.91
1911.....	2517	3.74

Clearly the record of 1911 does not appear as creditable as that of 1908 or 1909. It is possible, however, that some of the earlier figures do not represent the facts as correctly as some of the later, for the Bureau was only recently authorized to enumerate accidents.

Tamping With Dry Dust

It is interesting to note that at experiments at the Pittsburgh Testing Station, 2.5 lb. of black powder, and 0.9 lb. of "bug dust," tamped with a wet material, gave a flame nearly double the length of that when black powder was used alone. When using 1.25 lb. of black powder with 2.6 lb. of wet dust, the flame was about proportionate to the size of the charge, but when dry dust was used, the proportions remaining the same, the flame was two and one-half times as long as when black powder was used alone. Other experiments, made with the same weight of both dry and wet tamping, and using 2.5 lb. of black powder resulted in a flame 50 and 70 ft. long, respectively.

The Lignite Industry in Texas

By Wm. B. Phillips*

The state of Texas contains approximately half the lignite acreage of the United States, for which reason the economic possibilities of this grade of fuel have been more thoroughly studied and further developed there than in other parts of our country. About 90 per cent. of the producer-gas horsepower of the United States is in this state, and it is believed that this might be adapted successfully to the smelting of iron ore.

*Director, Bureau of Economic Geology and Technology, University of Texas, Austin.

According to the most reliable statistics now available, there are in the United States 123,700 square miles of workable lignite, divided among the states as follows:

State	Sq. Miles
Texas	60,000
North Dakota	31,000
Louisiana	8,800
Montana	7,000
Alabama	6,000
Arkansas	5,900
South Dakota	4,000
Tennessee	1,000
	123,700

In the year 1910, the U. S. Geological Survey gave the production of lignite as follows, in short tons:

State	Tons
Texas	864,857
North Dakota	399,041
	1,263,899

Of this amount Texas produced more than 68 per cent. The total amount of lignite produced in Texas during the last 17 years is about 8,000,000 tons, valued at about $7,000,000.

Quality and Uses of the Texas Lignites

Allowing that the Texas lignites, *as mined,* will contain 33 per cent. of moisture (as a matter of fact the average of 38 analyses shows 29 per cent.) the average composition of these lignites is as follows:

Moisture	33.00
Volatile combustible matter	33.65
Fixed carbon	25.21
Ash	7.14
	100.00
Sulphur	0.60
B.t.u.	6,808

The heating power of these lignites, as mined, may be taken as 60 per cent. of the heating power of ordinary bituminous coal, or about the same as ordinary, fairly dry, hard wood, weighing 4000 lb. to the cord.

By far the greater part of the lignite mined in Texas is consumed by steam plants, although a considerable portion is used in domestic fires and the remainder in gas-producers. There is little or no lignite used in locomotives and none in making briquettes. One or two attempts have been made to manufacture briquettes but they did not develop into a commercial success. It is of special interest in this connection to note that some of the Texas lignites make a good briquette without an artificial binder.

The Texas lignites, like all others, slack readily on exposure to the air. They fall to pieces and soon go into a more or less coarse dust and cases of spontaneous combustion are not unknown. On account of this "slacking" it is not customary to carry large stocks. What is mined today is used tomorrow, or, at any rate, as soon as possible.

The briquettes, made without an artificial binder, hold their shape and size for a long time. Samples of such briquettes have been in my possession for 18 months and show no signs of disintegration, while originally firm and solid pieces of lignite have long since broken up. This difference between lignite and lignite briquettes constitutes a strong argument in favor of the latter.

Texas Gas-producer Plants

During the last two or three years there has been a marked increase in the number of gas-producer plants in Texas. In 1908-09 there were 16 such installations in the state and 36 in 1911. In 1908-09 according to R. H. Fernald (U. S. Geological Survey Bulletin No. 416) there were 8001 producer-gas horsepowers in Texas and 7618 engine-horsepowers. In 1911 these had been increased to about 13,000 and 12,270, respectively.

With but few (and these unimportant) exceptions, practically all of these plants are using lignite as the source of gas. It is quite probable that nearly 90 per cent. of the producer-gas or engine-horsepowers derived from the use of lignite are in Texas. Some of the establishments here are of large size, one has 4400 engine-horsepowers, another 3300, another 1200, etc., all from lignite gas. From a careful survey of the matter it is thought that the yearly consumption of lignite for gas making is about 80,000 tons. The cost of this lignite, delivered, varies from 90c. to $3.65 a ton, according to the haul, etc. The longest haul is about 300 miles from the mines to the producer plant.

The yield of gas per pound of lignite varies a good deal, as might be expected, the range being from 28 to 49 cu.ft. If we take the lowest recorded yield, 28 ft., a ton of lignite will yield 56,000 cu.ft. of producer gas, suitable for use as fuel or for the gas engine. With an incandescent mantle this gas is also well adapted for illuminating purposes.

Efficiency of the Producer Plants

In actual practice and on a large scale (the consumption of the lignite being from 60 to 70 tons a day) the average composition of the gas was as follows:

Carbonic acid	10.30
Ethylene	0.40
Oxygen	0.50
Carbon monoxide	12.60
Hydrogen	8.70
Methane	4.80
Nitrogen (by difference)	62.40

We may, I think, safely allow that from this lignite there is obtained 60,000 cu.ft. of gas, yielding 123 B.t.u. per cu.ft. In Bulletin No. 189, University of Texas, Drury McN. Phillips has given the results of producer-gas practice covering the use of 233,920 lb. of lignite, from which a yield of 66,740 kw.-hr. of energy, equivalent to 89,411 hp.-hr. was obtained.

The composition of the lignite used was as follows:

Proximate	
Moisture	10.80
Volatile combustion matter	42.76
Fixed carbon	40.38
Ash	6.06
	100.00
Ultimate	
Moisture	10.80
Carbon	49.63
Hydrogen	2.86
Oxygen	28.08
Nitrogen	1.94
Ash	6.06
Sulphur	0.63
	100.00
B.t.u. per pound	9756

If we take the entire period covered by the operations under consideration we find that the pounds of lignite per horsepower-hour varied from 1 to 3.2, the general average being 2.2. During this period of 48 hours the heat units in the gas varied from 103.3 to 139.9 per cu.ft., the general average being 123.4. The composition of the gas also varied, as follows:

	From	To	Average
Carbonic acid	8.2	11.8	10.30
Ethylene	0.1	2.3	0.40
Oxygen	0.2	1.8	0.50
Carbon monoxide	8.2	17.6	12.60
Hydrogen	3.6	12.8	8.70
Methane	0.4	7.6	4.80
Nitrogen	57.6	65.6	62.70

Operating Companies and Byproducts

The cost of the lignite delivered, was $1.62 a ton and the raw fuel cost of 89,411 horsepower-hours was 2.11 mills per hour. At this plant there were 3300 engine-horsepowers operated entirely on producer gas made from lignite. At an adjoining plant 4400 engine-horsepowers

are being installed for operation with the same kind of gas. In Texas the following companies have installed producer-gas plants: Bethlehem Steel Co.; Fairbanks, Morse & Co.; Elbert Harvey (Industrial Gas Co.); Herrick, Irvin, Power & Mining Machinery Co. (Loomis-Pettibone); Smith; Westinghouse & Wood. The following gas engines have been used: Alberger; Allis-Chalmers; Bethlehem Steel Co.; Buckeye; Fairbanks, Morse & Co.; Foos; Muenzel; Nash; Rathbun-Jones; Snow; Weber and Westinghouse. The Bessemer Gas Engine has not been used on lignite producer gas but is used on natural gas.

There has been no attempt made in this state to utilize the byproducts from lignite such as tar and ammoniacal liquor, except that a little of the tar is used for "dipping" telephone poles, arms, etc. Perhaps the time has not come for this industry, but as the population increases there may be opportunity for the establishment of central stations sufficiently large to make the recovery of byproducts profitable. Other uses to which lignite producer gas may be put is in lime kilns, brick plants, etc. Some white-lime plants have already tried this, but for some reason or other the results were not satisfactory.

Producer Gas for Smelting

There has recently been considerable interest shown in the development of the iron ores of east Texas. These ores are limonites, the so called brown ores, and contain from 10 to 12 per cent. of combined water. This water is not removed under a dull-red heat and it is suggested that lignite producer gas could be profitably used in calcining these, together with certain carbonate ores found in association with them. The unit of iron in these ores is worth 8c., a 50 per cent. ore being worth $4 a ton at Philadelphia. Such an ore would carry 55 per cent. of iron if deprived of its combined water and would be worth $4.40 instead of $4. Should these ores also contain ordinary moisture (if they are washed they contain from 5 to 10 per cent.) this would also be removed by calcining. Furthermore, the reducibility of these ores is greatly increased by calcining. They become more porous and require notably less coke in the blast furnace.

The iron-ore districts of east Texas are also the lignite districts and it would be possible to deliver good lignite at ore mines for $1.25 a ton, or even less. The ores could be calcined and shipped to coast points or used locally, without carrying either ordinary or combined water and at the same time be greatly improved for blast-furnace use. If the ordinary and combined water should be 12 per cent. of the ore and a train of 16 cars be hauled two of these cars would be water.

A Large Mine Hoist

One of the most powerful winding engines ever built is now in course of construction at the works of the Sandycroft Foundry Co., Ltd., near Chester, England. This is being built in duplicate and both exactly alike as regards size and design; they are to be used to wind from the same vertical shaft, which has a depth of 3700 ft. The speed of winding will be 3000 ft. per minute, with superheated steam at 120 lb. pressure per square inch and an unbalanced load of 12.5 tons.

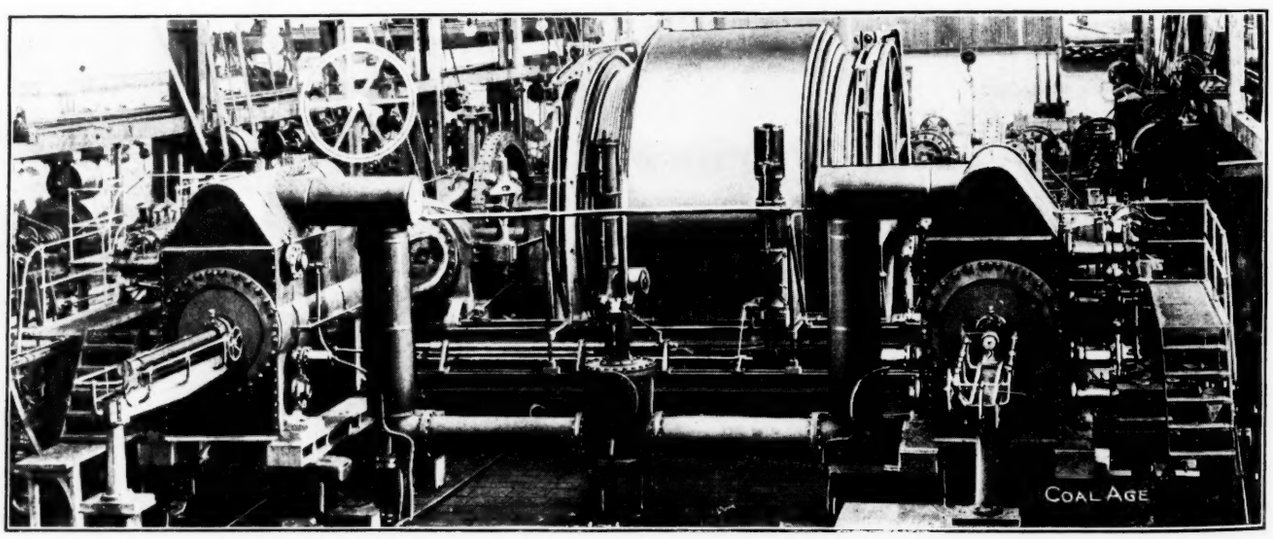
The engine is of uptodate design, the valve gear being of the improved corliss type and placed on the outer sides. The valve spindles have spherical metallic packing and the end pressure of the valves is balanced by springs, the eccentric shafts for operating the valve gear being connected to the crank point by drag links. The cylinders, which are 42x84 in., have separate liners and are steam jacketed, each body being cast separately from the two end pieces which carry the valve chambers. The pistons are fitted with metallic packing rings, the outward pressure of which is adjustable; the piston rods are 8 in. in diameter.

The crossheads are of steel with cast-iron adjustable slippers, a special feature of the machine being the method of attaching the piston rods to the crossheads. Each rod passes through a steel plate, heavy nuts on either side of the plate securing it in position. The plate is bolted to the crosshead by four bolts, thus retaining the advantage of being able to easily adjust the distance between the centers of the piston and the crosshead when connecting or disconnecting the piston rod and crosshead.

The guides are of circular form, 41 in. in diameter, while the beds are of massive design, being of the "mammoth" type. The drum-shaft bearings, which were cast with the beds, have the steps lined with a special white metal and are 21 in. in diameter and 33 in. long.

A special feature in the design of the crank disks is that they are made in two pieces—each disk being 9 ft. 2 in. in diameter, the center hub being separate and having a flange cast on one end of it; the disk itself has been bored to fit the hub to which it is keyed. It is also bolted to the flange, thus making it very secure and giving the advantage of reducing the weight and overall dimensions of the drum-shaft for export. Brakes are provided for the disks which are operated by a hand wheel, screw and foot.

The drum-shaft which is 25 in. in diameter has an overall length of 27 ft. The drum itself is of a combined cylindrical and conical type, of cast iron,



General View of an English, 42x84-in., 5500-hp. Colliery Hoist

grooved for 1¾-in. rope, the cylindrical part being 20 ft. diameter and 8 ft. 9 in. wide. There are two small internal drums, fitted inside the main drum, for carrying spare rope, which can be payed out as required.

Two main brakes of the suspended curved post type are provided, power being applied to both ends of the posts. They are operated by a steam brake engine, the brakes being put on by means of a weight and held off by steam; steam can also be put on the top side of the brake-engine piston, if extra pressure on the brakes is required. The brakes are adjusted automatically as the brake blocks wear down. The engine is reversed by means of a steam reversing gear, having an oil locking and controlling cylinder. The main steam valve is 18½ in. in diameter, of the single-beat type, the valve being balanced by a steam piston which makes it very easy to operate.

The engine has been fitted with "Gott's" controlling gear for preventing overspeed, overwinding and starting in the wrong direction. In case of overspeed in any part of the wind the gear automatically shuts off steam and applies the brakes. It also operates in the same way if on nearing the surface the driver has not reduced speed sufficiently to land the cage safely, or if the driver starts his wind in the wrong direction, i.e., if he is taking the cage into the headgear instead of into the shaft. The total weight of the engine is 250 tons.

Kelvin Memorial

A memorial to the late Sir William Thomson (Lord Kelvin) is being planned, and a large general committee has been formed consisting of four or five members from each of 19 of the leading engineering societies in Great Britain, United States, Canada, South Africa and South Australia. Sir William Cawthorne Unwin, L. L. D., is chairman of the general committee, and Sir William H. White, K. C. B., chairman of the executive committee.

An appeal has been sent out, signed by W. E. Garforth, president, The Institution of Mining Engineers, and L. T. O'Shea, honorary secretary, asking for contributions to the fund it is desired to raise. The proposal is to erect a memorial window in Westminister Abbey, as a suitable tribute of respect to this distinguished engineer who stands today as the foremost man in the scientific world.

The appeal states that contributions to the fund should be sent either to Dr. J. H. T. Tudsbery, honorary treasurer, 12 Dartmouth Street, Westminister, S. W.; or to Messrs. Coutts & Co., Bankers, 440 Strand, W. C., treasurers to the fund.

Work of Coal Cutting Machines

Mine and Quarry gives the following account of the work of the Sullivan continuous cutter illustrated on the front cover of July 27 issue of COAL AGE. The author of the paper is G. W. Thomas.

The experiment was conducted between Dec. 13, 1911, and Jan. 13, 1912, in mine No. 2 of the Lumaghi Coal Company at Collinsville, Madison County, Ill., upon a Sullivan continuous cutter.

The test was to determine the cutting capacity and power consumption of the machine, as shown by measurements, time observations, and readings from a recording wattmeter.

DESCRIPTION OF MACHINE

The continuous cutter is mounted on a starting frame or pan, on which the machine travels in making its rib or sumping cut and which is detached when the cut across the face is begun. The machine is moved in all its operations in the working place on a continuous chain, which is engaged by drive sprockets, operated through feed gearing. The gearing is protected by a friction clutch, which is so loaded as to slip when the machine encounters obstructions in the coal. A shunt-wound motor of 30 hp. is employed.

Number 2 Lumaghi Mine works the No. 6 seam, which is eight feet high and practically level, although rolls or horsebacks occur in some localities. The coal varies in hardness in different parts of the mine, but is free from sulphur or other impurities. There is a good slate roof, so that close timbering is not required, and mining is done in the coal, as close as possible to the fire-clay bottom. The mine was formerly worked on the double entry plan, but the panel system is now preferred.

Two areas were assigned for the test, in one of which the coal was rated as "hard," in the other as "soft," and a territory of 24 rooms in each was set aside. The work was done in these rooms and in crosscuts between the rooms. The places ranged from 18 to 45 ft. in width, and averaged 31 ft. The Sullivan machine first cut in the "hard" territory, working three alternate days, single shift. The same procedure was followed in the "soft" territory so that the test covered six shifts. Cutting in this way over the territory described enabled the loaders to keep enough room cleaned up so that a full day's cutting was ready for the machine every other day.

The readings and measurements were made by two observers, who checked each other's work and who made affidavit at the conclusion of the test as to the fairness of its conditions and the accuracy of the results contained in their reports.

TAKING THE READINGS

The observations taken in each working place included the time, at the beginning and end of each part of the operation; the power consumed, shown on a recording wattmeter of standard make; the average voltage, shown by a voltmeter in the room; the width of the room or break through and the depth of the undercut. After each room was completed, the wattmeter was reset at zero.

No readings were taken while the machine was moving on its truck, as the test had to do only with actual mining, and, since the length of the moves varied, observations began in each room with the unloading of the machine from its truck and ended when it was reloaded and ready to move to the next place. The following is a sample set of readings:

NO. 2 EAST STUB ENTRY OFF NO. 9 SOUTH

Operation	Time	Watt Hrs.
Unloading	2.00	0
Finished	2.06	150
Sumping	2.06	150
Finish d	2.11	600
Cutting face	2.15	600
Finished	2.35	4300
Loading	2.50	4500

MEASUREMENTS AND READINGS

Average voltage	225
Average depth cut	73 in.
Width of room	24 feet
Watts per sq. ft	30.8

"Unloading" includes moving the machine into place against the right rib.

The machine had 24 loaders assigned to it, and kept sufficient cutting ahead to provide continuous work for all.

DETAILS OF TEST

Days	6
Hours cutting	36.45
Places cut	32
Feet cut	1000.75
Average depth,inches	71.7
Total sq. ft. cut	5,976
Total tons mined	1,770.66
Total watt-hours	263,950
Average voltage	191.1
Ft. of face per hr	27.2
Ft. of face per day	166.79
Sq. ft per hr	162.6
Sq. ft. per day	962.7
Tons per day	295.11
Watt-hrs. per sq. ft	44.0
Watt-hrs. per ton	147.37

SUMMARY OF READINGS

Date	No. of Places	Face Ft.	Face In.	Average Depth, Inches	Square Feet	Actual Cutting Time Hrs.	Actual Cutting Time Min.	Total Watt Hours	Wts. per Sq. Ft.	Average Voltage
Dec. 13, 1911	6	168	10	70.0	984.3	6	17	43,475	44.1	191
Dec. 16, 1911	6	186	8	72.1	1,121.5	6	26	48,575	43.3	193
Dec. 19, 1911	5	145	2	72.1	872.2	5	16	35,600	40.8	191
Jan. 4, 1912	5	149	5	73.1	910.1	6	22	38,800	42.6	194
Jan. 5, 1912	5	168	9	72.8	1,023.7	5	42	45,600	44.5	185
Jan. 8, 1912	5	181	11	70.2	1,064.2	6	52	51,900	48.7	193
Total	32	1000	9	71.7	5,976.0	36	45	263,950	44.0	191.1

Current Coal Literature

The Best Thought Culled from Contemporary Technical Journals, Domestic and Foreign

Coal in British Columbia in 1911

The "Annual Report of the Minister of Mines" for British Columbia for 1911 was issued early in July, from which the following information relating to coal-mining has been extracted:

The report of the Board of Examiners for coal mine officials shows that at the examinations held in the spring and autumn of 1911, 17 candidates passed for first-class, 17 for second-class, and 67 for third-class certificates.

The quantity of coal mined in 1911 was 2,297,718 tons (of 2240 lb.), gross, that is including the quantity made into coke, as compared with 3,139,235 tons in 1910—a decrease of 841,517 tons. This decrease was due entirely to labor difficulties in the Crow's Nest coal field, these having caused a cessation of production over a period of about eight months at nearly all the district collieries. The actual decrease in this field was 923,062 tons of coal, but an increase of 81,545 tons in the coast district reduced the net shortage to the quantity first above shown. The net output of coal in the two years was 2,193,062 tons in 1911 and 2,800,046 tons in 1910. The coke figures for the same years were 66,005 long tons in 1911 and 218,029 tons in 1910. The net decrease in 1911 as compared with 1910 was, therefore, 606,984 tons of coal and 152,024 tons of coke.

The gross production in tons of 2240 lbs., of the several collieries was:

Vancouver Island		
Canadian Colliers (Dunsmuir) Ltd.	768,911	
Western Fuel Co.	575,177	
Pacific Coast Coal Mines, Ltd	208,116	
Vancouver-Nanaimo Coal Mining Co., Ltd.	72,918	1,625,122
Nicola Valley		
Nicola Valley Coal & Coke Co. Ltd.	191,290	
Inland Coal & Coke Co.	10,883	
Diamond Vale Collieries	4,970	207,143
Similkameen		
Princeton Coal & Land Co. Ltd.		23,396
Crow's Nest, East Kootenay		
Crow's Nest Pass Coal Co. Ltd.	320,940	
Hosmer Mines, Ltd.	39,399	
Corbin Coal & Coke Co.	81,718	442,057
Total Production, gross		2,297,718

Of this the Crow's Nest Pass Coal Co. made 84,991 tons into 54,160 tons of coke, and the Hosmer mines, Ltd., 19,665 tons into 11,845 tons of coke. There was not any coal made into coke in 1911 at the ovens of the Canadian Collieries (Dunsmuir) Ltd., at Union Bay, Vancouver Island.

The total sales of coal by the province during 1911 amounted to 1,986,475 tons (2240 lb), of which 1,373,779 tons or about 69 per cent. was sold for use in Canada and 612,698 tons, or 31 per cent. was exported—573,888 tons to the United States and 38,808 tons to other countries. The sales of coke totaled 73,454 tons (including 7449 tons taken from stock)—72,187 tons for use in Canada, and 1267 tons exported to the United States.

Employment was given to a total of 6873, this number including 230 boys among the 6146 whites, and the following other classes of labor: Japanese 184, Chinese 530, Indians 13, total, 727. There were employed underground 4818 white men, 149 white boys, 171 Japanese, 71 Chinese and 3 Indians. This shows that of the total of 5212 employed underground, 4967 were whites and only 245 of other races. White labor only was employed at collieries on the mainland.

The statistical tables show that of about 34,000,000 long tons of coal (net) produced in the province during 36 years, 1876-1911, fully one-half was the production of the last ten years—6,721,000 tons during five years, 1902-1906, and 10,477,000 tons during five years, 1907-1911. The aggregate production of coke was 2,317,000 long tons.

Byproduct Coke Ovens

In the issue of August 3, the address by W. E. Hartman of the Koppers Company to the Engineers' Society of Western Pennsylvania was abstracted and a brief report was made giving the salient points of the correspondence presented as discussion at the meeting. The reading of these letters was followed by the following remarks made orally by the persons mentioned.

Dr. F. Schniewind said:

The officials of the Cambria Steel Company of about fifteen years ago—Powell Stackhouse, C. S. Price, and Joseph Morgan are to be credited with initiative and progressive foresight. They clearly foresaw the future of the byproduct oven and exhibited their faith by building the Johnstown plant.

Better Blast Furnace Use of Byproduct Coke

Mr. Hartman suggests that the quality of coke from byproduct coke ovens erected in this country was not altogether satisfactory. This is misleading, because at the time byproduct coke ovens were first introduced into this country there existed prejudices in regard to the quality of coke on the part of the blast-furnace men.

A test showed the superiority of byproduct coke over that from beehive ovens in smelting iron ore. If coking is too much hastened there is a great waste of byproducts. Byproduct oven gas will give 640 B.t.u. per cu.ft. After a mechanical test involving a high fall, revolving in a tumbler and severe compression, only 66 per cent. of the beehive coke was still fitted for furnace use but 76 per cent. of the byproduct coke could be thus used. High volatile coal gives large cells with weak walls.

The ideas of blast-furnace superintendents in regard to the quality of coke required have undergone material changes. I wonder what a blast-furnace man would have said in the year 1895 when the first byproduct coke-oven plant for blast-furnace use was built at the Cambria Steel Company's works if the suggestion had been made to him that he should use only broken coke of egg size. He would never have allowed this material to be charged into his furnace.

Why the Coke is Crushed

It is, however, a well-known fact that coke from the ovens described by Mr. Hartman breaks up in unduly small sizes, for which the heating conditions of these ovens are responsible. It was therefore necessary to screen and size this coke. This necessity, according to the author becomes at once a virtue.

I want to be understood that I do not wish to decide here the question whether

large or small coke is best for a blast furnace; that matter the furnaceman must decide for himself. I only desire to point out that in these ovens the percentage of coke of small size is larger than in other types of ovens and that all types can prepare coke of uniform size.

It was proved long ago that the coal containing a high percentage of volatile matter which made an excellent coke in American beehive ovens would not produce a coke in a byproduct battery which would meet the specifications given by the average American blast-furnace superintendent. In order to prove whether the objections against the byproduct coke were well founded about 3000 tons of coal were coked in United-Otto byproduct coke ovens in the year 1898 and were tested in a blast furnace under the supervision of John Fulton and E. A. Uehling. The test proved that the furnaces used 100 lb. less byproduct coke than beehive coke per ton of pig iron and that the capacity of the furnace materially increased.

Great Heat and Short Coking Time

It would take us too far to discuss at present the various heating systems of coke ovens, but with very much simpler means other types of ovens obtain even a greater uniformity of heating than the type described by the author. This is confirmed by the results at plants in operation. If the short coking time were actually a standard of uniformity of heating I could point out that batteries have operated in 14 hours not for a day but for months.

This naturally greatly increases the daily capacity of a plant; but that it will also decrease the cost per ton of coke to a minimum, Mr. Hartman will still have to prove. The destruction of byproducts is enormous when the temperature of the ovens is carried above a certain point, and therefore the craze for big capacities may not always be conducive to highest economy.

The first silica material was used about 14 years ago in connection with the byproduct coke ovens installed by the Cambria Steel Co., at Johnstown, Penn. In our construction for the last ten years, the ovens proper have been exclusively built of silica brick.

The first movement for increasing the size of ovens was made in the year 1902 when several plants with ovens 42 ft. 8 in. in length were built. These held a coal charge of over 9 tons against 6 or 7 tons before that time. A number of companies are now building ovens which take a 15-ton coal charge.

Low Volatile Coals Long Used

Mr. Hartman stated that, due to the Steel Corporation's experience with low volatile coal at Joliet, it has come to be generally believed that the best quality of blast furnace coke could only be made by using a low volatile coal or mixture of coals. This experience was gained at the Cambria Steel Co.'s plant about 14 years before that time. The Johnstown coal is lower in volatile matter than the Pocahontas and has been used at Johnstown continuously.

At that place one great additional trouble occurs, however; the coal is so full of impurities that it requires washing and the charging of the wet coal naturally increases the repair expense of the ovens.

It should be borne in mind that the market conditions for ammonia do not in all instances make the exclusive manufacture of sulphate of ammonia advisable.

The market for byproducts resulting from the use of byproduct coke ovens has been rapidly developed within the past few years, particularly for tar products. The use of tar for the generation of power will play an important part within the next decade. The enormous demands made, which are annually increasing, for high class fertilizers point conclusively to the fact that the market for sulphate of ammonia will share in the upward tendency.

The farmers are getting to appreciate more fully the great value of fertilizers blended with sulphate of ammonia. In fact there need not be any fear that the demand for all the products—namely, tar, ammonia and gas—will be, under normal conditions quite equal to the supply.

Coke-Oven Gas Plants

Undoubtedly the most notable example of the use of byproduct coke-oven gas in the world is the plant the United Coke and Gas Co. installed at Camden. From this center, a district extending more than 100 miles northerly through the State of New Jersey is covered by pipe line. The principal cities and towns served are Camden, Trenton, Princeton, New Brunswick, Plainfield, Perth Amboy and the intermediate districts.

The gas is forced under high pressure throughout the entire distance by a compressor plant connected with the central plant at Camden. The average heat value of the gas throughout the entire district will not fall below 640 B.t.u. No extra enrichment is required for the gas, and it more than meets the demands of the usual requirements of state laws covering the heat value and candle-power of coal gas.

Can Guarantee Surplus Gas to Give 600 B.T.U.

The most modern plant for the supply of gas to city service was erected by our company for the Citizens' Gas Co., at Indianapolis, Ind., and has been in operation more than two and a half years. The gas replaces that from wells and the franchise requirements in connection with the distribution system required the high heat value of 600 B.t.u.

A careful investigation by the officials of the company led to the adoption of the byproduct coke ovens of the United-Otto system to meet these requirements. During the winter season just passed (1911-1912), the most severe winter for many years, the company was able to keep up its supply to its customers, and the heat value, except in one or two instances, did not fall below 653 B.t.u. The candle-power was constantly maintained at more than the average requirements.

High Grade Gas From Byproduct Ovens

These particular instances will serve well to indicate the possibilities in connection with the utilization of byproduct coke-oven gas for lighting, heating and cooking purposes throughout large populous districts. There can be no end to the demand for gas which can be supplied to industrial establishments in connection with industries where byproduct coke ovens are installed.

The development of the gas business at Camden has required more than doubling the gas capacity of the original plant. This, however, has been accomplished by the addition of only 50 ovens as compared with the original installation of 100, which instantly gives an idea of the development of the productive capacity of single units although they are nominally of the same size as they were before, that is about 12 years ago. The plant of the Citizens' Gas Co. at Indianapolis is being doubled at this time.

Ovens Must Be Tight

There are many features in connection with the byproduct coke ovens which might be greatly enlarged upon if time permitted. The subjects worthy of larger scope of presentation are the development and advantages of silica bricks and the special importance of the tightness of the ovens where the manufacture of illuminating gas is involved. Incident to this feature is the necessity for the grinding of the bricks used in oven-wall construction.

The Cambria Steel Co. has a coal with a low percentage of volatile matter. It swells freely and the need for strong oven walls was early manifested at this plant. About 12 years ago it was realized that reduced operating expense could be obtained by enlarging the ovens. This led to the installation of several United-Otto ovens about 43 ft. long with a charging capacity of about nine tons and a coking time of about 20 hours.

Strength of Byproduct Coke

R. T. Hapgood* observed as follows:—I might call attention to some tests I carried out several years ago, to determine the relative strength of beehive and byproduct coke when subjected to physical tests intended to duplicate as nearly as possible the handling of coke between the time it leaves the oven and its final deposition in the furnace.

Coal from the Pittsburgh bed containing about 33 per cent. volatile matter and 10 per cent. of ash, was coked in two beehive and two byproduct coke ovens. One ton of selected large pieces from each oven was used for each test. The coke was placed in a box, approximately 4 ft. deep and having a drop bottom. This was elevated to a height of 10 ft.

The drop bottom was then opened and the coke allowed to fall at once on an iron plate. This procedure was repeated seven times and the coke then screened to sizes from ½ in. to 5 in.

Tumbling and Compression Tests

After the different sizes had been weighed they were carefully mixed together and then tumbled in a barrel. The barrel was revolved on its long axis, but off center, in order to give the coke more of a tumbling effect. Six or eight shovelsful of coke were used at once and the barrel revolved eight times.

The coke was then screened and, after weighing, carefully mixed, and subjected to the crushing test. This was done by filling an iron box 1 ft. on a side with coke, and then allowing a 7500 lb. weight to rest upon the cover, which just fitted inside the box.

After all the coke had been treated in this manner it was screened and the various sizes weighed. All coke remaining on the 1-in. screen or larger was considered furnace coke. From these four tests approximately 66 and 68 per cent. of furnace coke was obtained from the beehive product and 76 to 78 per cent. from the byproduct coke.

Coal With 34 Per Cent. Volatile Matter

E. A. Moore†: Pittsburgh coal with 34 per cent. volatile matter will make a suitable blast furnace coke for a 500-ton furnace.

W. E. Hartman remarked: My experience backs that conclusion. But lately experiments indicate that high heats and short coking time are going to enlarge the possibilities of the byproduct ovens very decidedly. The Koppers concern expects within the next few weeks to make some experiments on Pittsburgh coal with short coking time. As far as I know, I would not say absolutely that Pittsburgh coal can be used to make coke for a 500-ton furnace.

Large Cells With Weak Walls

E. A. Moore remarked: A peculiarity of some of the Pittsburgh high volatile coal is that no matter what the heat treatment is, it does not produce a strong structure when treated by itself. It is much like the so-called Ronco coal, or some of the coal from Klondike; it will not produce a suitable structure under any method of heat treatment that we have discovered.

It volatilizes so rapidly that it expands and makes such large cells with such weak walls that when it is put into the furnace the coke is so fragile it breaks down. This constitutes its chief manufacturing defect aside from its high sulphur content. As a result of the work recently performed at the Bethlehem plant we know that we can make coke structurally suitable for use in any furnace by mixing it with the right kind of coal.

Every coal has to be tried to find out what heat treatment it will stand. In Indianapolis we did not get good results from Kentucky coal by itself. We procured in West Virginia, coal containing 34 per cent. of volatile matter but in using it we found immediately, we would have to change the heat conditions.

In forty-eight hours from that time we produced coke having as excellent a structure as the Connellsville product. And from that day a large trade has been developed in strictly high grade foundry coke. At times the company has been 150 cars behind in their orders. It is especially suitable for the foundries making light iron castings requiring low sulphur. They guarantee the sulphur to be 0.6 and under, and moisture ¾ to 1 per cent.

*Chief chemist, Gulick-Henderson Co.

†President, American Coke & Gas Construction Co., Camden, N. J.

Effect of Parched Air

It has often been observed on return airways, where the air is warm and dry, that the lamps do not burn so brightly and the workmen become dry and thirsty. Tabe explains this by saying that the parched air absorbs the moisture from the body, and unless they have ample drinking water, their blood becomes thick and hot, resulting in feverish, painful lassitude. The same warm air, before reaching the lamps, has been absorbing water in its journey, and is thus so heavily charged with watery vapor that its oxygen is diluted, which results in dull and sickly lights.

Accidents from Explosions

Accidents from the use of explosives originate from three causes: defective explosives, defective detonators and inefficient men. It is hardly fair, in the view of H. E. Coll, expressed before the Mining Society of Nova Scotia, that "the miners should be asked to guard against the first two. Inefficient men need to be protected against themselves and to do this requires: (1) Rules governing the use of explosives, and the miners' actions under certain conditions; (2) a discipline that knows no mercy; (3) a general system of coöperative education. No rules can be adequate from a safety standpoint that do not place in the hands of special persons the fixing of all shots and the supervision of everything connected therewith. Without this you cannot have discipline in the use of explosives."

Materials for Filling Old Workings

Frank P. McKibben, of Lehigh University, has made an exhaustive test of the different materials used for filling old workings. The following table is a summary of his tests:

No.	Description of Test	Load in Pounds		Settlement in Inches	Settlement, Per Cent.
		Total	Per Sq.Ft.		
1	Rectangular pillar of mine rock..	489,150	42,000	5.26	0.29
2	Timber crib filled with mine rock.	900,000	63,300	7.08	0.30
3	Circular pillar of mine rock	361,600	85,000	4.51	0.31
4	Pile of broken sandstone, small sizes.....	581,000	209,000	4.36	0.46
5	Pile of broken sandstone, large and small sizes .	417,000	150,000	4.61	0.41
6	Pile of river sand.	600,000	216,000	5.00	0.63
7	Pile of small broken sandstone and sand.....	800,000	288,000	4.69	0.43
8	Wet culm in cylinder.	200,000	886,000	2.73	0.30
9	Broken sandstone in cylinder.....	300,000	1,330,000	3.66	0.35
10	Broken sandstone and sand in cylinder	300,000	1,330,000	2.42	0.23
11	Cinders in cylinder	300,000	1,330,000	5.33	0.51
12	Wet culm in cylinder.....	300,000	1,330,000	3.00	0.33
13	River sand in cylinder.....	300,000	1,330,000	3.35	0.32
14	Pillar of mine gob	600,000		2.43	

The Amount of Gas Contained in Disintegrated Coal

In order to obtain some data regarding the amount of gas that might be contained in disintegrated coal, an experiment was made by filling a receptacle having a capacity of 2¼ cu.ft. with a mixture of duff and pea. The box was rammed full of this small coal and water added until it was standing level with the top of the box, the total amount being six gallons. From this experiment it was roughly seen that for every cubic foot of disintegrated coal there might be nearly half a cubic foot of gas at atmospheric pressure. It now becomes a question of pressure as to how many cubic feet of gas can be obtained in "pockets" to produce outbursts.

Who's Who—in Coal Mining

Devoted to Brief Sketches of Prominent Men, Their Work and Ideas

In that great state of Alabama where Nature outdid herself by placing coal on one side of a valley, iron ore on the other side, and then left plenty of available ground for man to locate his ovens and furnaces between these deposits of two great basic minerals, many big men have been called to wrestle with the complex problems which have necessarily accompanied the vast developments that have occurred.

In the coal-mining field of this premier Southern state, if we judge by ability and broad experience, no individual has carved for himself a better name or a more enviable reputation than Erskine Ramsay, vice-president of the Pratt Consolidated Coal Co. Mr. Ramsay was born in 1864 at Six Mile Ferry, a suburb of Pittsburgh, Penn. His parents moved to Shafton in 1865, and it was in the public schools of this latter town and Irwin, Penn., that he received his early education.

Young Ramsay's father was a great believer in keeping the boys at work when there was no school, and from the time when Erskine was quite small the elder Ramsay would take the youngster with him when surveying in the mines; as a result of this early training "E. R." acquired a taste for mine work long before he had shed his short trousers.

He was 13 or 14 years old when his father decided he would start the boy in the store business, and as a result of this resolve young Erskine found himself in charge of a mercantile establishment in a store of his own, built on a lot owned by his father. About the time this commercial enterprise was started, a number of the Shafton Coal Co.'s employees induced the elder Ramsay, who was superintendent, to make his store a coöperative affair, and as a consequence, the Shafton Coöperative Society was formed.

The capital stock of the company was divided into $10 shares and was distributed among the workmen. The enterprise was carried on for about two years, and when any of the employees left the company, they usually sold their stock to Mr. Ramsay's father. The outcome was that when the society's affairs were wound up, so that young Erskine might go to school, each $10 share was found to be worth $22.50, and, in addition, the stockholders from the very beginning had received their supplies at cost, plus 4 per cent., which was to pay freight charges and cover the actual expenses of doing business.

ERSKINE RAMSAY

During the last public school days of young Ramsay at Shafton, Penn., he was called every morning at 5 o'clock to work in a machine shop, and only stopped in time to get breakfast before going to school. In this way he earned from $25 to $30 a month. During one of the terms of the Shafton school, he held the job of janitor for his room at $2 per month.

Beginning in September, 1880, and continuing until March, 1881, Mr. Ramsay attended his last public school, at Irwin, Penn. Following this, he clerked in the Carnagie Bros. office of the Monastery Works, where his father was in charge. After about six months engaged in this clerical work, he was made assistant machinist, and a little later master mechanic for the Monastery Works, having charge of all machinery in and about the mines.

In 1882, Mr. Ramsay entered St. Vincent's College, near Beatty Station, Westmoreland County, Penn. He graduated from this institution in June, 1883, at the head of his class, thereby winning the college gold medal. In addition to the regular work, he took a technical course, including surveying, chemistry and physics.

Immediately thereafter, when he was not quite 19 years old, he succeeded his father as superintendent of the Frick company's Monastery mine and coke works; the elder Ramsay having been made superintendent of mines of all the Frick company's operations. In his work as mine superintendent, young Ramsay paid close attention to the details of his job, watching the ovens closely to see that they were charged with every pound of coal they would take. As a result of this close attention, the ovens under his supervision produced one month an average of 4.6 tons per oven drawn. When these figures were gone over at the city office, in Pittsburgh, Mr. Frick said there was some mistake and issued orders that the report be checked up. It was found to be correct, and the next month the output was run up to 4.17 tons. Never before had any Frick ovens produced as much as 4 tons of coke, and, as a result, Mr. Frick was highly pleased.

While superintendent of this plant of 208 ovens, Erskine Ramsay did all the necessary surveying and map work for his mine at night, after the day's work was completed. He was the youngest superintendent in the coke region, and probably holds that honor up to the present time.

In the early part of 1885, Mr. Frick suggested to the elder Ramsay, that his son Erskine be placed in charge of the Morewood Coke Co., Ltd. The young man himself was not in favor of the change, as Morewood was one of the largest propositions in the coke region, and he was not anxious to take on such further responsibility. However, the order was given, and, on Feb. 4, 1885, he became superintendent of the Morewood company, reporting direct to Mr. Frick, who was president and owned part of the capital stock, the remainder being controlled by some of the Illinois Steel Co. people. Later, Emmett A. Upstill resigned as superintendent of the South West Coal Co., with ovens at Tarr and Stonerville, and "E. R." was put in charge of these properties in addition to his position as superintendent of the Morewood company. A little later, the Red Top Works, near Tarr, were purchased from S. Dillinger & Sons, and these plants were also included under young Ramsay's charge.

A short time after this the three companies were consolidated under the name of the South West Coal & Coke Co., with Mr. Ramsay in general charge. This consolidation was at that time the third largest company in the region. He was succeeded in the management of the South West Co. by his uncle, Morris Ramsay, Oct., 1886, when "E. R." was promoted to be assistant engineer for the H. C. Frick Coke Co. In his new position he was put in charge, along with other duties, of the construction of the

new "Standard" works at Mt. Pleasant, Penn., which, at that time, was the model plant of the country.

Is Made Superintendent With T. C. I. and R.R. Co.

In Feb., 1887, T. T. Hillman, vice-president of the Tennessee Coal, Iron & Railroad Co., wrote J. K.Taggart, manager of the Connellsville Coke & Iron Co. (Leisenring interests), Connellsville, Penn., asking him to suggest a man for the position of superintendent and engineer of the Pratt Mines Division, T. C. I. & R.R. Co. Mr. Taggart recommended Erskine Ramsay for the place, and after the latter had spent one week in Alabama looking over the Pratt mines he returned to Pennsylvania, and on giving the matter due consideration, decided to accept the position with the Tennessee people.

When he took charge of the Pratt mines, "E. R." found that many of the methods used in that field were not up to date. For instance, there were no maps of the mines, which resulted in the workings not being driven with systematic regularity. His attention, therefore, was devoted to inaugurating an efficient system of mine development and definite plans for drawing pillars. The general condition of the plants were brought up to the standard by the introduction of many improvements. Shaking screens were introduced, and much of the output was put on the market as lump. The slack was washed and a coke produced far superior to the old article.

The first coal washer was erected at shaft No. 1 in 1892, and was of the regular Robinson type, with a capacity of 400 tons in 10 hours. This washer was an English type, brought to this country by Col. Shook, vice-president of the T. C. I. & R.R. Co., and Capt. Chamberlain, of Chattanooga. The second plant at Pratt was built at Slope No. 2 with a capacity of 600 tons in 10 hours. In its erection Mr. Ramsay introduced a number of improvements and additions, on which he took out patents. This improved washer came to be known as the Ramsay-Robinson and proved quite a success. It may be said in this connection that the regular production of a superior grade of basic pig iron was largely due to the successful washing of the Pratt coal.

During the 15 years Mr. Ramsay was with the T. C. I. people he made a great many changes at its various plants. The more important improvements were the split system of ventilation, the introduction of shaking screens, the installation of boiler plants at coke ovens for raising steam from waste heat, and the introduction of inside boilers for furnishing steam to pumps and engines, thereby creating ventilation of the furnace order.

In 1894, when J. H. Paddock, chief engineer of the H. C. Frick Coke Co., was killed in a riot at the Davidson Coke Works, near Connellsville, Thomas Lynch, the general manager of the Frick company, at the suggestion of Mr. Frick himself, offered "E. R." the position. Notwithstanding this flattering offer, which would have made Mr. Ramsay chief engineer of the greatest corporation of its kind in the world, he decided to remain with the Tennessee company. During this time his father was the general superintendent of mines and consulting engineer of the entire Carnegie-Frick interests.

In November, 1894, President Baxter of the T. C. I. company appointed Erskine Ramsay chief engineer and assistant general manager of all that company's interests. In February, 1896, while attending the annual meeting of the Amer. Inst. of Min. Engineers, of which society Mr. Ramsay is a member, he was approached by the Whitney people (Dominion Co.) of Cape Breton, which concern offered him the position of manager of their property, to take the place of Capt. MacKeen, who had been elected to the Canadian Parliament. The Dominion company made this offer to Mr. Ramsay because he had been suggested to them by H. C. Frick. The first offer made him had a salary of $6500 attached; this figure was finally raised to $12,500 with a certain stock privilege, which altogether made a very attractive offer. "E. R." finally decided to remain in Birmingham. Mr. Ramsay considers this offer, however, one of the most flattering he ever received.

Declined a $12,000 Offer

In 1898 he was offered the management of the coal mines owned by Senator H. G. Davis in West Virginia. In 1901 President Lynch, of the Frick Co., again offered him a position with that company. Both these flattering propositions were declined on account of the long length of time "E. R." had spent in the Alabama field, and because his investments and other interests were almost entirely located in that district.

Erskine Ramsay is interested in many different business enterprises in the Birmingham district, and no one in this Southern field has a better rating, or a broader acquaintance among business men of the South. With his name attached to a business proposition, success is practically assured.

In addition, he has erected and is the owner, of a great many tenements and business houses in Birmingham, Pratt City, Wylam and outlying districts. With the coöperation of G. B. McCormack, in 1899, he organized the Bank of Ensley, which under his direction has become one of the strongest financial institutions of Alabama.

In 1901, after 15 years continuous service with the Tennessee Coal, Iron & R.R. Co., Mr. Ramsay severed his connection with the latter concern and became vice-president and chief engineer of the Pratt Consolidated Coal Co., which position he still retains. The Pratt company operates about 20 mines and has an annual production of 2,500,000 tons. One of the most notable things about the Pratt company is the bonus system, whereby all employees receive yearly 1 per cent. on their total annual gross earnings for each year they have worked for the company, until it reaches 10 per cent., which is the maximum. The wages paid, in addition to the bonus, are the same as the highest wages paid in the district.

Mr. Ramsay has been honored many times by his own Commonwealth, in having served on various mining commissions and different committees appointed for the purpose of revising mine laws. He was one of the party of engineers appointed by the Bureau of Mines to investigate and report on coal-mining conditions in European collieries.

Simple Method of Emptying a Sump

For emptying a sump of a small amount of water, a wooden barrel, 3½ ft. in diameter and 4½ ft. deep, constructed of ½-in. plank, stoutly bound with four iron hoops, gives good results. The barrel should be self-filling, a small valve in the bottom, opening upward under the pressure of the water and allowing it to flow into the interior. Such a barrel has a capacity of about 250 gal. The number of hoists per hour, of course, depends upon the amount of water to be disposed of.

Spedding's steel mill was invented about the middle of the eighteenth century. He had noticed that the ignition point of firedamp was relatively high, and concluded that the sparks from the steel mill would always be at a lower temperature than the flame of a candle. By his mill he hoped to secure immunity from explosion, but there were many reasons why it should be a failure, and Spedding lost his life in an explosion.

The new Drager half-hour self-rescue apparatus is of the mouth breathing type and is constructed on the same principle as the larger machines, but with much smaller cylinders and cartridges. It weighs only 13 lb., is 14½ in. by 13 in. by 4½ in. It is all connected up and can be carried easily over the shoulder. The mouthpiece can be adjusted in less than 30 seconds, the cylinder and cartridges can be changed in half a minute, and each apparatus is fitted with a pair of smoked goggles. This apparatus, located at suitable places throughout a mine, in sealed tins, with easily removable lids, or carried by rescue corps would go far toward enabling men caught in the mine after an accident to escape.

Issued Weekly by the
Hill Publishing Company
JOHN A. HILL, Pres. ROB'T MCKEAN, Sec'y.
505 Pearl Street, New York.

Monadnock Bldg., Chicago.
6 Bouverie Street, London, E. C.
Unter den Linden 71—Berlin, N. W. 7.

FLOYD W. PARSONS, Editor.

Correspondence suitable for the columns of COAL AGE solicited and paid for. Name and address of correspondents must be given—not necessarily for publication.

Subscription price $3 per year in advance for 52 numbers to any post office in the United States or possessions, and Mexico. $4 to Canada. $5 to any other foreign country.

Subscribers in Great Britain, Europe and the British Colonies in the Eastern Hemisphere may send their subscriptions to the London office. Price 21 shillings.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday of week prior to date of issue.

Entered as second-class matter, October 14, 1911, at the post office at New York, New York, under the act of March 3, 1879.

Cable Address, "Coage," N. Y.

CIRCULATION STATEMENT

Of this issue of Coal Age, we will print 8250 copies. No copies will be sent free regularly. There will be no back numbers. The figures shown here each week represent live, net circulation.

This journal is interested solely in matters relating to the fuel industries, and is designed to be a medium for the free interchange of ideas, the detailed description of coal-mining practice, and the expression of independent thought calculated to benefit both operator and miner.

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COAL AGE

The Safety Lamp

In another column, in this issue, we give an outline of a paper, which discusses the practical use of the safety lamp in testing for gas. It is stated with much confidence that the common or "ordinary safety lamp, without elaboration of any kind, will continue to be the most popular and the most generally useful appliance, in the hands of a colliery fireman, for detecting the presence and estimating the amount of firedamp in the mine atmosphere." The author of the paper referred to, lays much stress on the importance of observing the density or degree of visibility of the flame cap, and asserts that this is a surer indication of the percentage of gas present in the mine air than is the height of the cap itself.

It is not the first time that this claim of preëminence for the density of the cap has been advocated. Its use, however, is restricted practically to firemen of the old country. Firebosses in this country, almost without exception, base their determination of the percentage of gas in the mine air on the observed height of the flame cap, and the action of the flame when larger percentages of gas are present, or as the firedamp mixture approaches the explosive point. In our own experience, we have found it easier to determine the percentage of gas by estimating the height of the cap than by trying to judge of its density. In the employment of the latter method (by density), a longer experience and a keener judgment and skill must be possessed to enable the observer to obtain the percentage of gas with the same degree of accuracy that is possible by estimating the height of the flame cap. It would seem that there would be, in the majority of cases, less chance of error by observing the height of the cap. This would be particularly true in comparing the determinations made by different observers, for each man's eyesight would be different. One's own sight is not permanent but constantly changing, and in the failing of the eyesight would lie the difficulty to determine accurately the degree of density of the pale-blue flame cap.

In regard to the size of the testing flame affecting the height of the cap, this is true; but the careful observer, when great accuracy is desired, will draw down his flame until the minimum height of cap is obtained, as explained in Dr. Clowes' book on "The Determination of Inflammable Gases and Vapors."

The author of the paper referred to, draws attention to the insecurity of safety lamps having but a single gauze, and suggests that this feature should almost "disqualify them for use as safety lamps." He, also, expresses the fear that there is much misplaced confidence in so-called safety lamps, which may be faulty in design or imperfect in workmanship.

His reference to the "popular but erroneous impression that, if undisturbed, the light firedamp will ascend to the highest accessible place and remain there," may be misunderstood by many readers. Firedamp being much lighter than air, if undisturbed, seeks the highest accessible places, in spite of the diffusion that is constantly going on. If this were not true marsh gas coming from the floor of the seam or from the coal would not accumulate, as experience proves it does, at the roof and in the higher workings, while the heavier blackdamp is found in such quantities in the lower workings.

The Index to Volume 1

The Index to Vol. 1 of COAL AGE accompanies this issue. Subscribers who fail to receive the supplement should notify us immediately.

For the benefit of those unfamiliar with methods of filing technical papers for future reference, we believe the present is an opportune time for a few suggestions along this line. It is our intention to make these completed volumes of COAL AGE the most comprehensive and

valuable set of reference works on the technical side of coal mining anywhere in existence. We also propose that they shall be a complete history of the industry. For this reason the provision of some method for preserving the different numbers is obviously desirable.

To the more affluent members of the profession, who may wish to have copies in duplicate, we recommend the purchase of the completed bound volume, a very limited number of which will be for sale. Some engineers who cross-index their technical papers, or have personal notes inscribed on the different issues, may, by sending these in to COAL AGE, have them bound at a cost somewhat lower than the cost of a new volume.

Convenient binders are also offered for sale at a nominal charge, in which the different issues may be filed as they arrive. To those not inclined to incur further expense in this direction, a satisfactory method consists of punching two holes along the binding edge and tying the different numbers together by means of a heavy cord.

It might be stated that these suggestions are not offered as an advertisement, since this work is done at about cost. The publishers regard the additional prestige accruing to the journal through establishing these permanent records, as sufficient recompense for their trouble in this direction.

Mine Legislation

In an interesting letter, just received, Frank Hall, Deputy, Department of Mines, Harrisburg, Penn., in commenting on the editorial "Fire Protection for Mines," COAL AGE, July 13, p. 55, commends the work of the National Fire Protection Association, and draws attention to the benefit already derived in Pennsylvania, which is largely attributable to the influence of the work of that association in support of the efforts of Chief, James E. Roderick to secure the passage of two important measures providing for the adequate protection of underground mine workings from fire.

The letter states:

"We have read with considerable interest an article in the issue of Coal Age, July 13, relating to fire protection for mines. This is a subject to which Mr. Roderick, the Chief of the Department of Mines, has given a great deal of thought during his long experience in mining matters. It has always been his opinion that the mines of Pennsylvania should have greater protection from fire and at various times he has suggested measures that would bring about the desired result.

"When the bituminous mine code that went into effect June 9, 1911, was being prepared by the Commission appointed by the governor, Mr. Roderick, who was a member of the Commission, had the following article incorporated:

" 'It shall not be lawful for the superintendent or mine foreman to provide a horse or a mule stable inside of any mine, unless space for said stable is excavated in solid strata of rock, slate or coal. If excavated in the coal seam, the wall shall be built of brick, stone or concrete, not less than 12 in. in thickness, and said wall shall be built from the bottom slate to the roof. Wood or other combustible material shall be used in the smallest practicable quantity in the construction of the inside of said stable. The air current used for the ventilation of said stable shall not be intermixed with the air current used for ventilating any other portion of the mine, but shall be conveyed directly to the return air current. No open light shall be permitted in any stable in any mine.'

"The disaster that occurred at the Pancoast colliery last year, in which 72 lives were lost and a great deal of property destroyed, led Mr. Roderick to take still more decisive action regarding this important question, and he prepared for presentation to the legislature of 1911, a bill providing for the fireproofing of all buildings inside the mines. This bill was passed and approved by the governor, June 15, 1911, and is known as Act No. 788. It provides in part as follows:

" 'Section 1. Be it enacted, . . . that within six months after the approval of this act, all buildings inside of any coal mine in Pennsylvania, including engine houses, pump houses, stables, etc., shall be constructed of incombustible material, approved in writing by the Chief of the Department of Mines: Provided, however, that the time may be extended by the Chief of the Department of Mines, for a period not exceeding six months, upon sufficient cause being shown by any person, firm, or corporation, of inability to comply with the provisions of section one as to the time therein specified.

" 'Section 2. Any company failing to comply with section one of this act shall be subject to a penalty of five hundred dollars, to be recoverable by the Commonwealth, as debts of like amount are now, by law, recoverable. Any superintendent of a coal mine failing to comply with section one of this act shall be deemed guilty of a misdemeanor and, upon conviction, shall be sentenced to pay a fine of one hundred dollars or undergo imprisonment in the county jail for a period of ten days, or both, at the discretion of the court.'

"Immediately after the passage of this Act the operators throughout both the anthracite and bituminous regions of Pennsylvania prepared to meet its requirements and, at this time, thirteen months after its approval, all the mines in the state, with the exception of two or three where extensive improvements are being made, are free from the combustible buildings that have heretofore been a menace to safety. Most of the operators had complied with the Act within six months after its passage, and had it not been for the enforced idleness occasioned by the strike which occurred during the early part of 1912, every mine in the state would today be entirely free from buildings of a combustible nature.

"The prompt action taken by the operators has been very gratifying to the Department of Mines. It is also a pleasure to know that the great coal state of Pennsylvania has taken an advanced position in the matter of protecting mine operations against fire, for it may mean a great deal in the future not only in the preservation of human life, but also in the preservation of property. We trust that the National Fire Protection Association may be able to accomplish, in other states, in the way of legislation, what has already been accomplished in Pennsylvania."

Blind imitation does not mean good mine management, and there are many pitfalls for the man whose judgment is warped by admiration for some particular mode of working that has proved successful in a seam adapted to that method. Thousands of tons of coal have been wasted in working longwall under unfavorable conditions, and the same may be said of the room-and-pillar system. Different seams require to be worked in different ways, dependent upon the inclination, thickness, hardness or softness of the coal, joints in the cover, faults traversing the field, and so forth.

When water is given off at a fault, we may expect it to be followed by gas, because, being lighter than water, it is held at a high pressure above it, and this causes a rapid or violent outflow of water. As the gas cannot sink in the water, being the lighter of the two, none will appear until all the water has been expelled.

Discussion by Readers

Comment, Criticism and Debate upon Previous Articles, and Letters from Practical Men

Humidity of Mine Air

Referring to the communication from Frank Haas, COAL AGE, July 20, p. 93, in reply to a letter from James Ashworth, I want to say that should Mr. Schoew repeat his former statement that air with a relative humidity of 94 per cent. will keep dust damp, this is not my experience. I have not yet found that air saturated to that extent will dampen coal dust or even allow it to retain water that has been applied with hose, when the air is moving at ordinary velocities in the mine entries.

It is natural to assume that we have now reached the stage where we can get definite facts regarding the humidification of mine air—facts derived from actual practice. The figure, 100 per cent., suggested as a minimum by Mr. Haas, would no doubt help to settle this controversy, if we could have readings taken in all parts of mines where steam humidifying is in use. Is it true that 100 per cent. has ever been attained in all parts of any mine during the winter months, and if not, why not? If 100 per cent. humidity is maintained in some mines, why has it not been reached in others?

Can it be denied that the object of introducing steam into the intake is to help out the sprinkling; or, to prevent, as far as possible, the rapid evaporation of water applied with the aid of hose piping? Hose sprinkling is carried on daily in the mines I have visited where steam humidifying is in use.

Now that this important discussion is underway in COAL AGE, I would like to suggest another vexed question to be cleared up, namely: How is it proposed to efficiently humidify the air of a mine ventilated by an exhaust fan, the intake airway being the main haulage road and travelingway, and the conditions not permitting the use of a blowing fan? James Dalrymple, inspector of mines for the state of Colorado, tells us that whether a blowing or exhaust fan is used, we should heat the ingoing air sufficiently so that it will absorb the steam and carry it into the mine in the form of vapor, thereby rendering it invisible to the eye. Do Haas and Schoew agree with this statement?

Also, can anyone tell us the number of boilers of a certain capacity and the quantity of water necessary to be evaporated per hour to supply steam to fully saturate, say 350,000 cu.ft. of intake air per minute, and at the same time raise its temperature well above the ordinary temperature of the mine when the outside temperature is zero?

There are numerous mines in this country where exhaust steam is not available, and a problem that recently came to my notice was this: What equipment and water will be required to efficiently treat, during the winter months, 45,000 cu.ft. of intake air per minute, at a mine where the face temperature, 2¼ miles inby, was 79 deg. F.? I may add that it is not necessary to leave this state to find a natural face temperature of 79 deg. F.

I am sure that replies to these numerous questions will be appreciated and cannot fail to be of great value to readers.

SAMUEL DEAN.

Delagua, Colo.

Another Letter Concerning Humidity of Mine Air

The letter of Mine Inspector Karl F. Schoew, COAL AGE, July 20, p. 93, has not advanced this subject materially. Mr. Schoew says that air saturated at 60 deg. F. (when it contains 5.8 grains of water vapor per cubic foot of air) will keep all combustible material wet. If, then, the safety of a mine depends on a certain weight of water vapor in the air, it ought not to be limited by the temperature of the air. Mr. Schoew has, thus far, certainly left the matter in a very undecided position. He acknowledges that 14.38 grains of water per cubic foot of air would probably not agree with the ideas of many mining men, and to get over this difficulty he goes on to say that where the temperature approaches 90 deg. F. the *air should be tempered*, at least before it enters the working place.

Does he mean to say that the temperature of the air must be lowered? If this is his meaning, he introduces an impossibility, until some discovery is made that will enable us to cool mine air to any desired temperature, at a depth of, say 900 yd., and 1½ miles inby from the shaft bottom.

What I would like to have is an expression of opinion from any of our readers as to how many grains of water vapor per cubic foot, at reasonable mine-air temperatures, say between 60 and 90 deg. F., should be in the air to be efficient as a safeguard against the extension of an explosion, and at the same time sanitary for miners to breathe.

In the 1911 report of the Minister of Mines for British Columbia, the inspectors of mines in the various districts tabulate hygrometric readings in the mines. The report shows that at an elevation of 3000 ft. above sea level the highest water content was 6.2 grains per cubic foot, and the lowest 4.4 grains per cubic foot of air. The temperature given for the highest content was 66 to 64 deg. F., and the lowest 56 to 54 deg. F. At, say 500 ft. below sea level, the highest saturation was 6.6 grains per cubic foot, and the lowest 3.8 grains per cubic foot. The corresponding temperatures were 64 deg., dry bulb, and between 65 and 66 deg., wet bulb, in the first instance; and, in the second instance, 52 deg., dry bulb, and 50 deg. F., wet bulb.

The highest saturation possible, at a temperature of 66 deg. F., would be 7 grains per cubic foot of air. It must be further noted that these readings were taken in the return airway.

JAMES ASHWORTH.

Vancouver, B. C., Can.

The Fireboss and His Work

No fireboss is capable of examining a gassy mine when under the influence of liquor. I would not employ a man for that work who drinks. Too many hundreds of lives of women and children depend on his work, to run any risk in this regard. His is dangerous work; he must rise early and reach the shaft on time. Often there is no one there to bell him away at the top, and no one accompanies him in his round of the shaft. Again, when his work is finished no one can bell him away from the bottom. There is no one at the mine whose work is more difficult or dangerous, and few other than firebosses realize the difficulties he daily surmounts in his task.

During the past fourteen years I have firebossed in England and America. I have worked in a good many mines, and have found a vast difference, both in superintendents and operators. Many superintendents have no consideration or thought of the inconvenience and dangers to which a fireboss is exposed. In many mines he is regarded as a general, handy man, who is or should be able to do any work he may be called on to do. After he has examined the mine, the foreman will often say, the first thing I want you to do is to go to such a place and lay some track; or pull down some slate; or, timber a bad place; and many

other like things that are in need of attention. I believe every fireboss should be able to arrange a brattice or fix a door that is required to produce better ventilation of the places in his charge.

The chief work of the fireboss, however, should be to examine carefully and see that every working place is free from gas and properly ventilated and safe for men to work therein. His examination should not be for gas alone; he should examine every working place carefully to see that there is no loose slate or coal that may fall, either at the working face or on the roadway. He should see that there is no obstruction to the flow of the air current; and that the brattices in the rooms are so arranged as to conduct the air to the face. When this work is properly done there will be little time for timbering and trackwork, which can generally be done better by a regular timberman and tracklayer.

Terre Haute, Ind. FIREBOSS.

Flame Caps and Firedamp

I have noticed the remarks of Benjamin Hartill, COAL AGE, July 6, p. 17, where he quotes the statement of men that say they have found firedamp mixtures giving caps 1½ to 3 in. in height that "would neither explode or burn when an open light was exposed to them." The explanation that it was a case of "gas needing air" is, in my opinion, immaterial; this may be true or it may be otherwise. Probably many men have taken the risk of exposing an open light to such a mixture of gas and have not only lost their own lives thereby but endangered the lives of hundreds of other men working in the mine. We have guessed at what caused the explosion, but the real cause, in many cases, probably has not been known.

I never allow myself to venture with an open light in a place where the air contains 1.5 per cent. of gas, if I know beforehand that the gas is present. I do not think it is necessary for a fireboss to raise his lamp into a body of gas until he gets a 1½-in. cap.

It is important for a fireboss to examine every place in his district, and not assume that a place has "no gas," because he has never yet found gas in that place. A fireboss may visit a place several days in succession and find no gas, and the next morning there may be a large quantity of gas that will make the place unsafe.

I believe it is important that more chemical tests be made of the air in mines, in connection with determining the height of flame caps for certain percentages of gas. There is not one fireboss in a hundred that can estimate correctly the percentage of gas present in the air, from the height of a flame cap in the lamp. Moreover, one may take an open light into a place where there is 1.5 per cent. of gas present, 99 times without causing any trouble, and the hundredth time an explosion may follow.

I recall an incident, in my own experience as fireboss in a mine, where I examined day after day and found gas standing in the old works, which were poorly ventilated. Later, when I visited the same place in company with the inspector, we had to sit down and wait for the gas to settle before we could get a cap in the lamp. Walking straight into the gas and putting up the lamp we could get no cap. My report to the mine boss, stating that there was considerable gas accumulated in the place, was ignored by by him, but one day he found the gas with his open light, to his own discomfort. I would strongly advise that any place containing gas that will give a cap in the common Davy lamp, should first be cleared of gas before men are allowed to enter the place. In every such case notify the mine foreman, at once.

JOHN SUTTON,
Secretary Indiana Mining Institute.
Terre Haute, Ind.

Examinations in Montana

Under the old mining law, in Montana, mine foremen of gaseous mines were required to take an examination, and to receive and hold a certificate of competency from the coal-mine inspector. In 1909, a new law was passed, creating examining boards for mine foremen, firebosses and mine inspectors. Under the old law, the mine inspector was required to be a "graduate of a recognized school of mines," thirty years of age, a citizen of the United States and of the state of Montana, and actually employed in coal mining for a period of ten years previous to his appointment as mine inspector. Under the new law (1909), the state coal-mine inspector, besides possessing the above qualifications, must have passed a successful examination by the Board of Examiners, and his certificate of qualification shall have been filed with the governor by the said Board of Examiners. The appointment, as previously, is made by the governor for a term of four years.

The examining board for mine inspectors is appointed by the governor once in four years, as required by law. This board is composed of one practical coal miner, actively employed in coal mining in Montana, one mine manager or superintendent who shall be recommended to the governor by a majority of the coal-mine operators of Montana, and one practical coal-mining engineer. The first examination of candidates for state coal-mine inspector was held Jan. 9, 1911; but the new law requires the examining board to meet and hold this examination on the second Monday in December of each even numbered year.

For the examination of mine foreman and mine examiners (firebosses) the new law provides that the judge of the district court of any county shall, on the petition of the state coal-mine inspector, appoint an examining board of three persons, consisting of the state coal-mine inspector, a miner, and an operator or superintendent. This board shall be known as the County Examining Board. Candidates for mine-foremen certificates must be at least 23 years of age, of good moral character, citizens of the United States and of Montana, and have at least five years' practical experience in coal mines.

Candidates for a certificate as mine examiner or fireboss must have the same qualifications as those mentioned for mine foremen, except the examination is less difficult. All candidates, in examination, are required by law to obtain an average of 75 per cent. in the examination before a certificate can be granted.

A commendable feature of the new law is the provision made therein, authorizing the use, by candidates, of such textbooks as shall be decided proper by the board. The new law also provides for the granting of service certificates and issuing certificates to those holding similar certificates issued by competent authorities in other states. The law authorizes the charging of a fee of $5 for such certificates. Since this law went into effect in 1909, there have been granted 46 service certificates, 26 exchange certificates and 77 certificates upon examinations, making a total of 149 certificates. In the Montana examinations, the fireboss questions stand first, and the mine foremen's examination embraces both the fireboss questions and the questions pertaining more directly to the work of mine foremen.

A general feeling of satisfaction is manifest among candidates attending the examinations, in reference to the permitted use of textbooks, by candidates, in the examinations, under the new law. This is a boon to the practical man, who has learned the proper use of mining textbooks and is familiar with the different formulas and tables they contain, but who has been unable to memorize these so as to use them without looking at the book.

The books give the candidate more confidence; he feels more at home; and there is far less temptation to make use of dishonest means to pass the examining board. In the old way, many good practical men would not go to the examination, because they were afraid they could not pass the board, and were ashamed to try with the prospect of failure before them.

I am satisfied that the law will have a good effect, and a better class of men will be able to get certificates than ever before. It is a wonder to me that the plan has never been tried till now. We would not go back to the old way.

MINE FOREMAN.
Red Lodge, Mont.

Colliery Notes and Comments

Practical hints gathered here and there, and condensed to suit the busy reader

Lignites from North Dakota, Texas and California can be successfully briquetted without a binder.

When manufacturing briquettes, remember that most large companies buy their fuel on specification or analysis and that washing the coal before briquetting will reduce the ash and volatile matter.

Iron emergency mine fire doors if suspended would probably in case of an explosion be likely to close automatically, thus quickly reversing the air current and possibly saving the lives of miners trapped in the mine.

Provided that coal is properly mined and blasted in successive shots, all field observations show that permissible explosives give the best results and yield the largest amount of lump coal, when experienced shotfirers are employed.

In order to have a perfect combustion of coal there must be an adequate supply of oxygen. A pound of coal requires 12 lb. of air to supply the correct amount of oxygen. The heating value of clean slack coal is equal per pound to that of lump coal.

The states of Pennsylvania, West Virginia, Alabama, and Colorado use permissible explosives to a considerable extent. Their use has greatly increased since the results of the black powder tests, made at the Pittsburg testing station, have been published.

New South Wales can justly claim to have the richest and most extensive coal field in the Southern Hemisphere. The famous Greta seams contain upward of 40 ft. of excellent clean coal. The Newcastle coal measures contain 10 great seams varying in thickness from 6 to 20 feet.

A paper read before the Midland Institute of Mining, England, recounts the fact that the writer had once observed the charred embers from the wick of an oil-burning mine lamp ignite a cloud of dust raised by animal haulage. Every day seems to bring forth more clearly the dangers which may result from coal dust and open lights of any description.

In an application of electricity to shaft signaling at a large colliery in the North of England, a visual indication of the signal is given both at bank and at the shaft botton, on luminous indicators. The visual indication does not appear until both the men concerned, the onsetter and the banksman, have concurred and performed their part in the signaling. It is claimed that this method of signaling has a number of advantages; a signal that can be seen is clearly to be preferred.

Wooden props with steel collars for use in gangways give good results as the steel is well fitted to resist bending stress under transverse loads, while the strength of the wood under compression is greater than its power to resist bending. A 4-in. H section can be used advantageously in this manner. Girders should be spaced from 4- to 3-ft. centers with their ends resting directly on round timber posts, which make a solid and strong support. Their use gives an extra 4 in. of head room.

To prevent loss of life by overwinding, detaching hooks are usually adopted, but they only protect the ascending cage, and afford no security to persons on a descending cage. By the use of automatic controllers attached to the winding engine, both cages are protected. These controllers seem reliable, so far as they have been tried, and inspectors suggest that it is desirable that they should be generally adopted for engines used for winding large numbers of men at one time, or at great speed.

Falls of roof in mines are all too numerous, and the experience of an inspector is that the addition of a prop or two would prevent many accidents. It is a common expression with pitmen that no one was ever killed with a bad roof, and this is in a great measure true with a roof which is known to be bad, because in such cases a miner sets sufficient timber to prevent the roof falling. In what is called a good and safe roof too much reliance is placed in sounding the roof, when what is really needed is a prop under it.

According to the chief of the Department of Mines of Pennsylvania, the increase in the number of accidents during 1911, had been unusually small. The occupation is without doubt much more hazardous than it was 20 years ago, and the dangers seem to be constantly increasing, owing to the difficulties encountered in mining the deeper seams, and the employment of ignorant and inexperienced men from the agricultural regions of Southern Europe, and yet the percentage of fatalities has increased but slightly.

The freezing process of shaft sinking, in its present state of development, seems to stand at the head of all special methods of sinking. It contains in itself two factors that are not and cannot be claimed for any other method of sinking. The freezing is relatively independent of the thickness and water content of the strata traversed, and it is the only system by which an exact calculation can be made in advance, enabling a contract price to be fixed and certainty of success attained within a given approximate time.

Good results can be obtained with electricity in mines without an excessive amount of copper. The reduction of the amount of copper used, together with the use of a low potential current ought to reduce mine accidents, due to electricity, almost to the vanishing point. One coal company which has used a 275-volt system with good results for the last seven years has had only one fatal accident due to electricity during this period. A current of 300 volts or under may be considered low potential and 300 to 600 medium, while anything above 600 volts is high.

A mine well equipped electrically, means that all trolley wires are at a uniform distance of 6 to 8 in. outside the rails; that the power is so arranged that it can be cut off from one section in case of roof falls, etc., without disturbing the remainder of the system; that properly placed section-line switches connect all machine lines, located in room headings, to trolley wires so as to enable the runner to cut coal in any heading he may desire by changing the switch; that, roof conditions permitting, all positive and negative wires are placed on the roof and protected by inverted troughs where animals or men must pass underneath; that all controller frames are grounded to locomotives; all high-tension transmission lines are protected by lightning-arresters and all switches cross-banded.

Examination Questions

Selected from State Examinations, or Suggested by Correspondents

Montana State Coal Mine Inspectors' Examination

(Selected Questions)

GEOLOGY

Ques.—What is an outcrop?

Ans.—The outcrop of a seam or vein is its exposure on the surface. The line of outcrop is the line indicated by the seam where it meets the surface.

Ques.—What is meant by the *strike,* and what by the *dip* of a coal seam?

Ans.—The strike of a seam is a level line lying in the plane of the seam. The direction of this line referred to the meridian is the direction or bearing of the strike of the seam. The dip of a seam is a line drawn at right angles to the strike and lying in the plane of the seam. The direction of the dip of a seam is the direction of the projection of this line on a horizontal plane, referred to the meridian.

Ques.—What distinguishes a stratified from an unstratified rock?

Ans.—A stratified rock is distinguished by those characteristics that indicate its original bedding, or show that it was originally deposited in horizontal layers. An unstratified rock gives no evidence of having been so deposited. A stratified rock differs from an unstratified rock by possessing more or less distinct bedding planes, which correspond to the original horizontal planes in which the material was deposited.

Ques.—What is meant, in geology, by the terms bed, seam, vein and dike?

Ans.—A *bed,* in geology, refers to the originally horizontal plane in which the material forming the bed was deposited.

A *seam,* in geology, is a stratum of varying thickness, enfolded or embraced in other strata, which may be conformable or otherwise to the seam; that is to say, the overlying or underlying strata of a seam may have been deposited in the same plane as the seam, or otherwise. When strata are conformable, their bedding planes are more or less parallel.

A *vein,* in geology, refers generally to the material, in place, filling a crack or fissure in rocks. This term has frequently been wrongly used to describe coal seams, in the anthracite region of Pennsylvania. The term should not be applied, however, to a bedded material such as coal. A vein lies in the plane of fracture of rocks, which may correspond more or less closely to the bedding plane of the strata, but generally cuts across the strata.

A *dike,* in geology, is a more or less vertical or inclined wall of rock, formed of matter that has been intruded into a fissure in the rocks. Like a vein, a dike generally cuts across the strata. It differs from a vein in being composed of igneous material, while a vein is generally of less thickness and may be composed of igneous material, but is generally the result of infiltration and crystallization.

Ques.—What is meant by a fault?

Ans.—A fault, in geology, refers to any break in the continuity of a stratum. Faults differ in their character according to the manner of their formation. There are, in coal mining, *faults of erosion,* which, however, geologists are not inclined to term "faults"; and *faults of dislocation.* A true fault is a fault of dislocation, sometimes called a step fault.

Ques.—What is the difference between a horseback and a step fault?

Ans.—A horseback is a term often used in coal mining to describe a sudden pinching out of a seam of coal. The thickness of the seam decreases very rapidly along a certain more or less well defined line. The horseback may occur in the roof or in the floor; but, in either case, the result is the rapid thinning out of the seam. In a short distance the coal will come in again and the seam attain its original thickness beyond the horseback; otherwise, the coal is said to have pinched out entirely, in which case the trouble is not termed a horseback.

A step fault is a fault of dislocation. In this case, the strata have slipped on each other. There has been a fracture of the rocks and the strata on one side of the fault have slipped up or down, so that there is a break in the continuity of the several strata.

Ques.—How do clay veins, rock rolls, or any faults or dislocations affect the safety of the men and the economical extraction of the coal?

Ans.—In driving entries or rooms through a fault there is always a large amount of deadwork, which is expensive. There is rock to be blasted and loaded out, and little or no coal is mined, while the cost of timbering is often much increased. The irregular character of the roof and the presence of slips, in most cases, make the work of passing through a fault dangerous. In many cases, there is a change in the gaseous condition of the seam, at a fault line. It frequently happens that the gas that was formerly generated in the mine disappears when a fault is reached and penetrated. Again, gas often appears at a fault when previously no gas was present. It is not uncommon for water to make its appearance at a fault line and give considerable trouble.

Ques.—What is a fossil?

Ans.—A fossil is the more or less petrified remains of some form of life, either animal or vegetable. In the formation of a fossil, the organic matter has been gradually replaced by silica, with the result that the original form and appearance of the substance have been more or less perfectly preserved.

Ques.—What do you know of the composition of coal, and how is coal supposed to have been formed?

Ans.—Coal is composed chiefly of carbon, being the metamorphosed remains of organic matter, in which has been occluded a greater or less quantity of gases generated by the chemical changes that the material has undergone. The occluded gases of coal seams are chiefly hydrocarbons, nitrogen, carbon dioxide and traces of oxygen. Coal is commonly supposed to have been produced by the slow and gradual metamorphism of vegetable matter. The change has been produced through the agency of heat and pressure, continued for ages.

Ques.—How do we distinguish the various coal seams, at points wide apart?

Ans.—The identity of coal seams, at points widely separated, is determined by a study of the order of superposition of the seam and the underlying and overlying strata. No dependence can be placed on the thickness of the strata, except in a general way; but these are recognized and their identity determined by the character of the rocks and the fossils they contain, aided by a study of the order in which the strata occur.

Ques.—If you were in search of coal, how would you endeavor to find it?

Ans.—First, by a knowledge of the geology of the country; second, by the record of prospect shafts and drill holes; third, by an examination of the surface indications, such as the outcroppings of the seam and other strata, known and recognized as the "coal measures," together with the drift found in the washings of small streams and such indications as are commonly called "coal blossom." This last consists chiefly of the iron stain caused by the filtration of surface waters carrying iron and sulphur in solution. These indications are familiar signs to the prospector for coal.

Sociological Department

For the Betterment of Living Conditions in Mining Communities

Colliery Yards and Gardens

By Edward O'Toole*

In accordance with notices published under date of Apr. 15, 1912, premiums for the best kept yards and gardens at the plants of the United States Coal & Coke Co., Gary, W. Va., were awarded to householders on July 23 and 24. The awards were made by a committee consisting of Prof. C. R. Titloe, director of agricultural extension, College of Agriculture, West Virginia University, Morgantown, W. Va., Dr. E. A. Schubert, traveling agent of the Agricultural and Industrial Department of the Norfolk & Western Ry. Co., Roanoke, Va., and Prof. Hanifan, state superintendent of rural schools, Charlestown, W. Va.

The prize given was $10 for the best kept garden and $5 for the best kept yard at each plant, with an additional prize of a fine lawn swing, which was awarded by the agricultural department of the Norfolk & Western Ry. Co. for the best kept garden and premises found at any of the works of the United States Coal & Coke Co. This prize was awarded to John Wolfe (German) at No. 9 plant.

The awards made by the committee are as follows:

*General superintendent, United States Coal & Coke Co., Gary, W. Va.

In making the awards, the location and natural conditions were taken into consideration, as well as the general appearance of the yards and gardens.

The householders, as well as the company, are greatly indebted to the committee which made the awards, for the interest it took in the work. A committee could not have been selected better qualified for determining the winners, as all members were men who are interested in the advancement of the agricultural resources of the country.

The interest and pride taken by the householders in keeping their yards and gardens proved a revelation to the entire committee. The vegetable patches are almost invaluable to those who tend them for they assure them of fresh vegetables throughout the greater part of the year. After seeing the gardens, the committee estimated that from a monetary view alone, they would yield at least $100 apiece, while a number of them are worth much more. An estimate of the gardens as a whole placed their value at from $15,000 to $20,000.

The manner in which the gardens and yards are kept at the various works shows that the householders are becoming awakened and begin to know what good gardens mean to them. Improvements in the house lots also lead to sanitary betterments, and great benefit is derived from this source.

Dr. Schubert, who served on the committee last year, said that in his opinion the sanitation had improved and that the gardens were at least 200% better.

These premiums will be awarded from year to year, as improvements in the yards and gardens will be of vast benefit to the householders, the company and the surrounding community.

AWARDS OF U. S. C. & C. CO. FOR WELL KEPT YARDS AND GARDENS

	Premiums					
	Yard			Garden		
Works No.	House No.	Name	Nationality	House No.	Name	Nationality
2	62	Jim Marcelli	Italian	84	Rufus Tatum	Colored
3	23	Mike Wasso	Slavish	210	Zach Socosh	Hungarian
4	7	P. L. Gillespie	American	50	Paul Conchia	Slavish
5	44	Hugh Jennings	American	2	Andy Saxon	Hungarian
6	126	Jacob Brown	Colored	77	Arthur Gray	Colored
7	36	Jim Rose	American	52	Wm. Deush	German
8	40	W. A. Graham	American	48	Mike Dutsie	Polish
9	147	M. Grobolink	German	142	John Wolfe	German
10	61	H. C. Hann	American	76	Joe Wassus	Hungarian
11	114	J. W. Lester	American	110	A. P. Mitchell	American
12	76	J. E. Money	American	26	S. T. Spencer	American
			Honorable Mention			
2	130	T. G. Beckner	Colored	67	Wm Kyle	Colored
3	21	Jno. Cheronka	Slavish	47	Paul Kamonsky	Hungarian
4	137	L. K. Pack	American	132	S. L. Bowlin	American
5				7	Sam Monarch	Italian
6	62	John Forcing	Slavish	125	C. A. Woodson	Colored
7	58	W. R. Bird	American	51	Patsy Roose	Italian
8	50	Jno. Searcja	German	47	Geo. Semitosky	Polish
9	145	Jno. Kenner	German	36	B. Shubandy	Polish
10	59	James Hess	American	36	Andy Barlee	Hungarian
11	56	Joe Cardwell	American	51	Frank Fredella	Italian
12	80	R. L. Waldron	American	60	D. B. Spencer	American

Note—House No. 142 at No. 9 works was awarded special premium of lawn swing, given by the agricultural department of the Norfolk & Western Ry. Co.

Is Mine Water Germicidal?

Samuel G. Dixon, commissioner of health of the State of Pennsylvania, has just issued his report for the year 1909. He states that experiments have been made on the effect of mine water in killing bacilli, the water serving for his experiment being taken from the Pine Hill Colliery near Minersville, Penn. Before going further it would be proper to say that the waters of this colliery are peculiarly strong and waters from some other mines would probably not show equally rapid germicidal effects.

John H. Strauch in sending in the sample makes the following note: "I might add that the sample of water I send may be considered typical of the average water pumped from this mine, but at the same time you will probably find no two samples of water from different collieries to be exactly similar." The Lytle Colliery barely a mile away has water which is remarkably free of corrosive chemicals. All the mine water of the anthracite regions is freer of ferric hydrate than that from the mines of the bituminous regions which consequently has a remarkably rusty appearance.

Nevertheless, the free sulphuric acid in the anthracite mine waters is usually considered to be in greater quantity than in those of the bituminous region, because in the former district there is less lime to neutralize.

The Mine From Which the Water Was Taken

To abstract the report of the Commissioner of Health:—The mine at Pine Hill is similar to the general run of anthracite mines where the dip of the measures is about 30 deg. The shaft is about 590 ft. deep and from the foot gangways and tunnels have been opened extending eastward about 2500 ft. and westward about 8000 ft. The beds worked are the Mammoth, Skidmore, Seven Foot and Buck Mountain. In the latter there are for the most part four lifts, but there are

only two lifts in the two first and upper beds. These lifts are about 100 yd. each.

The water supplied for test was such as is constantly flowing from the coal and surrounding strata and being collected in ditches. It passes to the foot of the shaft and is pumped to the surface. The sample sent had not been used for other purposes, for washing coal for instance, but was collected by holding the jar under the discharge at the upper end of the column pipe.

The Manner of Testing

Upon receipt of the sample at the laboratory it was kept in the refrigerator until used. In order to destroy whatever germs might be in the sample, the water was sterilized in Erlenmeyer flasks in the auto-clave at 115 lb. pressure for 15 min. It was then placed upon plain agar to test its purity, that is see that no development of germs would take place in that solid which is considered a most favorable medium for bacterial development. Flasks of tap water were used in parallel experiments to show that the germs were virile and able to live and thrive in uncontaminated water.

TABLE SHOWING GERMICIDAL ACTION OF MINE WATER

(1) Bacillus Typhosus

Volume of culture cu.cm.	Volume of water cu.cm.	Source of water	On mixing	No. of hours bacilli were in the water which had been sterilized. ¼	1	3	6	24	48	72
2	100	Tap	19×10^4	15×10^4	15×10^4	2×10^5		6×10^6	10×10^6	
2	100	Mine	2,500		0	0		0		
1	100	Tap	545×10^5	50×10^6	54×10^6	50×10^6	54×10^6	54×10^6		
1	100	Mine	4×10^5	3	0	0	0	0		

(2) Bacillus Coli

2	400	Tap	14×10^5		14×10^5	16×10^6		14×10^5		
2	400	Mine	58×10^4		15×10^4	6×10^4		15×10^5	0	100
1	100	Tap	8×10^7	8×10^7	7×10^7	75×10^6	7×10^7			
1	100	Mine	5×10^5	12×10^4	17×10^3	5200	24	0	0	

All water drawn from the tap or discharged from the mine was sterilized before using. Cultures were on agar and lasted 24 hours.

The results as shown in the accompanying chart, may be summed up as follows: Mine water will prevent the growth of typhoid bacilli after a lapse of one hour. It will markedly limit the growth of colon bacilli so that they die progressively, and cannot be cultivated after a lapse of 24 hours. In one experiment in which the dilution was high, the organisms lived for three days, but could not be found on the fourth day.

School of Mines of the West Virginia University

The School of Mines connected with the State University at Morgantown, W. Va., has just issued its Fall announcement. Morgantown is in the heart of the northern coal field of West Virginia. C. R. Jones, dean of the School of Mines and E. N. Zern, professor of mining engineering, are both men of energy and ability.

The school was organized in response to a demand from the mining interests of the state, in behalf of the young men in the mining districts, who have not had the opportunity of a high school training.

During the last two or three years the faculty have redoubled their efforts to meet the practical needs of mining in West Virginia. To this end they have been assisted by the members of the state Department of Mines and by the management of most of the larger coal companies in the state. The Elkins Coal and Coke Company have very generously offered the use of one of their mines to assist the school in its work of training students for practical mining work.

The faculty of the school, recognizing the fact that there are many bright, intelligent young men, as well as older men, whose work in the mine and whose limited time and means would not permit them to follow a full course of study, have attempted to meet this need by providing first a two-year course covering such subjects as are necessary to enable a man to pass the fireboss examination required in the state. Each year of the course is divided into two terms of twelve weeks each, so that, during the remainder of the year, the students may engage in practical work at the mines. This enables those students whose means are limited, to earn the expenses for the following year's course. At the end of the two-year course the privilege is granted to those who desire to continue, of taking a third year, which is designed to prepare them for the mine-foreman examination required in the state.

Applicants, 16 years of age, who have completed the eighth grade of the public school, or its equivalent, will be admitted to the school of mines without examination. Further provision is made for any who have been deprived of a common school education, provided they have completed the arithmetic and have a fair knowledge of the English language.

The first session of the school will open on Sept. 16, 1912, and close Mar. 1, 1913.

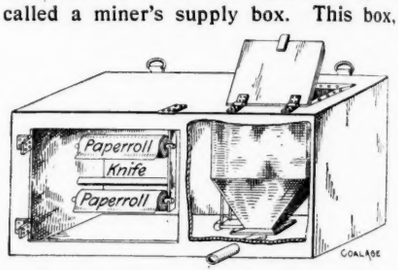
Handling Powder in Mines

Thomas Doyle*

Few miners realize the danger attending the common practice of handling powder, in the charging of holes, in mines where the coal is blasted. Beside the danger to which the miner is exposed in handling the powder when charging holes, he must consider also the loss he sustains when a keg of powder is stolen from him, or is not delivered at the right place.

In some mines the miners carry their own powder, in the keg, to the working face. In other mines the miner is not allowed to carry more powder into the mine, at one time, than he will use in one shift. Again, in other mines, the powder is delivered to the miner at his room, by the driver. In this last case, the driver often fails to deliver the keg at the right room and the powder is lost.

To obviate the dangers due to the handling of powder by the miner, and to avoid the possible loss by the powder being stolen, I have devised what may be called a miner's supply box. This box,



Miner's Box for Powder, Caps, Paper, Etc.

as illustrated in the accompanying figure, is made of steel or galvanized sheet metal, No. 26, and is 30 in. long, 15 in. wide and 18 in. high. The box is divided into two compartments. On one side is a hopper-shaped magazine capable of holding one keg of blasting powder. The bottom of the magazine is tapered, as shown in the cut and a metal tube conveys the powder from an opening in the bottom of the box to the paper cartridge, which is made to cover the end of the tube. The discharge of powder from the box is controlled by a slide at the bottom.

The compartment on the other side of the box is designed to hold a roll of the paper used for making the cartridges, a knife for cutting off the paper and an extra roll of paper, if desired. There is also room in this side of the box for the storage of fuse, soap, caps, etc. The box is provided with proper fastenings and locks. It is made fireproof and waterproof, and provided with hooks by which it can be hung on the mine timbers when desired. The powder magazine in the box is protected from heat by a lining of asbestos.

*Eldorado, Ill.

Coal and Coke News

From Our Own Representatives in Various Important Mining Centers

Washington, D. C.

Further discussion of the question of allotting coal cars to shippers has called forth another discussion on that subject from the Interstate Commerce Commission. In this the commission makes no new order, but directs the carriers to follow the principles laid down in the Missouri & Illinois Coal Co. vs. I. C. R.R. Co.

During a period of car shortage in the fall of 1910, the defendant, in accordance with its custom under such circumstances, mailed notices to the producers of coal, the substance and effect of which were embodied in the circular above referred to. As a result of this, some of the cars that were loaded but not billed by the shippers in accordance with the rule prescribed in said circular were refused transportation, whereupon the destinations of the shipments were changed and the same weré after some delay forwarded to other consignees. With respect to the provision of the rule that its requirements might be waived under special circumstances, the testimony shows that this feature of the circular was frequently relaxed in favor of the complaining shippers as well as others.

Alaska Coal Lands

Senator Jones, of Washington, has offered an important amendment to the bill to provide a supply of coal for the navy and to change the land laws of Alaska now pending in the Senate. In this he provides that "every person who located or entered, or attempted in good faith to locate or enter, any coal land in Alaska under the coal-land laws of the United States, prior to November twelfth, nineteen hundred and six, and whose location or entry thereof has been suspended, contested, denied, or canceled by the United States, is hereby authorized, at any time within one year from the date of the approval of this Act, to bring a suit in equity against the United States in any court of competent jurisdiction in the district where the land is situated to quiet his title thereto; and if, upon the trial of such cause, it shall be found by the court upon the evidence that the said locator or entryman had complied with the coal-land laws of the United States up to the time of the suspension, contest, denial, or cancellation of his location or entry, such location or entry shall be reinstated by order of the court, and the locator or entryman may thereupon complete said entry by making all the proofs that are required by the courts of the United States."

Colorado

Denver—It is reported that 10,000 acres of bituminous coal in the Yamka coal field of Routt County have been purchased by the McNeill-Penrose group, whose engineers have made a careful examination of the property some three years ago. It will not be a difficult task to run in spurs from the Moffat Road to the coal field. This transaction is said to involve a sum of about $750,000.

Illinois

Alton—The U. S. Bureau of Mines has been making some coal tests on the Pacific coast. Barry Flagg, formerly of Alton, has been conducting the tests for the Bureau, and is trying to determine what kind of coals are best for use in the navy department.

Kewanee—At a depth of 35 ft. a bed of coal 4 ft. 3 in. thick has been located on the Currier property. The firm of Engel & Nokes have secured a lease to mine the coal on the property, and have started operations.

The air shaft has been sunk and the boiler house erected. Pumps are in operation keeping the water out of the shaft. The coal is to be taken from the mine through a slope.

Pana—As a result of the action of the city council, the chief of police of Pana is going to serve notice on the Central Coal Co., giving them a specified time in which to remove their big slack pile.

Certain citizens living near the plant declare there is constant danger of fire. Mr. Ridgley, manager of the company, claims that the pile is not a slack pile, but merely contains clay and rock.

Sherman—The Illinois Midland mine, one of the largest in the state, has resumed action and, when it reaches its full capacity, will load one train of coal daily. It is expected that this will prove of great help to business on the Alton.

Streator—The miners employed by the Harrison Coal Co. are still out, but there is said to be a prospect of some sort of settlement this week, when the members of the State Board of the United Mine Workers of America are expected here for a conference with the strikers.

Indiana

Carbon—It is expected that a shaft will be sunk at Carbon, six miles west of Brazil on the Big Four, in August. The coal at the proposed mine is a 4-ft. bed of the best soft quality and at a depth of easy access.

Knightsville—The Nick Schripferman Coal Co. has practically completed their new mine, and will begin its operation during this week. The mine is on a spur from the Center Point branch of the Vandalia RR. and the cars will be taken to the main track on the branch on a private tramway. The new mine will have a capacity of about 800 flats per day and will give employment to a large number of men. This is an impetus for a number of miners, who are contemplating moving to other fields, to remain at home for work.

Linton—The Island City mine, the oldest in this field, has been closed, and the work of tearing down the tipple will be started soon. The Vandalia Co., which owns the machinery, will open a new mine one mile south, where 500 acres of coal land have been leased.

Failure of the operators of the new strip coal industry and the United Mine Workers to get together on the details of the work has practically tied up operations in that part of Greene county. The differences are said to be not so much a question of wages as of hours.

No coal has been put on the market as yet from the strip mine, the work on excavation being still carried on. The industry, however, promises to be an important phase of the mining business of the state. An effort will be made soon to organize the mines of the Clay City field, where district mining has been started on a large scale.

Wheatland—Five miners were hurt, probably fatally, in an explosion of gas in the coal mines of the Washington-Wheatland Coal Co. Their condition is considered critical. It is said that the gas was in the mine and was exploded by flames from a miner's lamp.

Iowa

Knoxville—During the past week the English Creek Coal Co. has begun to sink a shaft within the city limits near a place where a 4-ft. bed of coal has been struck at a depth of 60 ft. Switch connections have already been made for the mines.

Another new development in the Maryland County coal fields will be the new mine to be opened by the Rex Fuel Co.

In the Dallas Township coal fields the Consolidated Indiana Coal Co. is putting up the largest and most expensive hoist-

ing work, tipple and dump, ever erected in Iowa. The entire works when completed, both under and above ground, will include every new and modern device for mining, cleaning and shipping coal, as well as providing for the safety and convenience of the miners.

Seymour—A new coal mine will be in operation near this city, if the drilling that is being carried on proves that there is an abundance of this coal. The Ramsay Coal Co., of Oskaloosa, has charge of the work.

Kentucky

Henderson—The M. M. Moser Mines & Mining Co., which recently leased the old Keystone mining property, has begun operations and expect to get their production up to a maximum capacity of 1500 tons a day in the next few months. At present about 100 men will be employed and six grades of coal will be marketed.

Wallsend—Welfare work for the miners and mine employes is being undertaken in eastern Kentucky on a large scale. The Continental Coal Corporation is having plans made for the establishment of a hospital for its miners, while the Consolidation Coal Co. is erecting schools, hospitals, and other public institutions.

The Wisconsin Steel Co., which is operating a large number of coke ovens in Harland county, is building a Y. M. C. A. building at Benham. The State Committee of the Y. M. C. A. will furnish a trained secretary, and the Steel company believes that the effect of the work will be for good.

Michigan

Coldwater—Coal has been found in what is supposed to be rich deposits on the farm owned by Dan Warner. Just how the beds lie, and whether or not they are large enough to be mined profitably, is not known definitely.

Three wells were driven in a triangle, about 200 ft. apart. A thin bed of coal was located between 30 and 40 ft. from the surface, and a thick bed at 290 ft.

Tests have shown the coal to be anthracite, having 91 per cent. carbon and 1.5 per cent. ash. It is of a fine quality, and that which has been burned has thrown off a blue flame, and exhibits evidences of a high-class fuel.

North Carolina

An examination of the area known as the Dan River coal field, made by R. W. Stone, of the U. S. Geological Survey, in 1910, has led to the conclusion that there is no reason for expecting to find commercially valuable coal beds in this district. The high-grade coal which has been found in several places in this region in a seam ranging from a few inches to a foot in thickness, together with the belief of the people in the district that black shale is a sign of coal, and if followed far enough under cover will reach coal, has caused more or less prospecting.

The beds of anthracite in this region are merely local deposits of small lateral extent, and only a few inches thick. The thick bed of carbonaceous shale is valueless. It is, therefore, useless to expend the money and energy in this region in the hope of developing a coal mine.

Ohio

Columbus—Governor Harmon has appointed J. B. Davies, a member of the United Mine Workers, Zanesville, as the Ohio mine inspector to succeed George Harrison, whose term has expired. Mr. Davies was recommended by a number of prominent coal men.

The new mine inspector will receive an increase of $1000 in the annual salary, in accordance with a bill which recently passed the general assembly, providing a salary of $3000 for the mine inspector.

Steubenville—Nearly half a million dollars will be spent in Belmont County by the Providence Coal Co. for improvements, which are now under way. The company owns over 7000 acres of coal and their present mine, which is one of the largest in the state, is located at St. Clairsville.

Among the improvements which the company contemplates will be a large reservoir to supply the little towns which surround the new mine, the cost of which will exceed $50,000. The mine will open directly into the hill and will have seven entry ways through a concrete wall, several hundred feet long.

For a short distance back in each of these entries the sides and roof will be concreted. The tipple will be the largest ever constructed in the river countries, having four tracks and spanning the Wheeling Creek.

The company also intends to construct macadamized roads through its property and will erect a bridge over the creek. On the hill above the mine will be erected more than a hundred miners' homes. Each home will be surrounded by a large plot of ground and shade trees, and the houses will be lighted by electricity.

The new mine will be equipped with fifty of the most modern mining machines, which will be operated by electricity. Life-saving apparatus will be installed, consisting of oxygen helmets, pulmotors of types that are in use on the mine-rescue cars.

In addition to a three-story mine office and store, a small ice plant will supply the town of Fairmont with ice. Work will not be started on these improvements until the mine is in operation.

Toledo—Operations at the Toledo dock of the Hocking Valley Ry. Co., during the past week, have been very active. One hundred nine thousand tons were loaded during the week ending Aug. 2, as compared with 60,000 tons for the week previous. Since the opening of navigation the docks have handled 1,360,695 tons.

Pennsylvania

Anthracite

Allentown—The Lehigh Valley R.R., a few days ago, moved a train of 115 cars of coal. Another record was made when a train of 133 cars of coal recently moved westward from the Perth Amboy docks for the Mahoning yards, where they will be distributed to the mine. The train was more than a mile and a quarter long and was drawn by two locomotives, a third pushing.

Hazleton—Twelve hundred men went on strike, July 29, at the Hazleton colliery of the Lehigh Valley Coal Co. The cause of the trouble was due to the fact that the company refused to discharge a man who was not a member of the union. The strike also ties up the Eberlee and Derragan collieries.

Lansford—The Lehigh Coal & Navigation Co. is having trouble with their train force in the Panther Creek Valley R.R. The entire force of 85 men went on strike this morning, tying up every colliery in the valley. The men demanded a 10 per cent. increase in wages, and the company refused, giving as its reason that it is no common carrier.

Washington—Seven hundred acres of coal land in Cecil Township have been sold to the W. M. Henderson Coal Co., Pittsburgh, for $225,000. The coal is known as the McPherson block. Twenty-seven acres of surface land, and a railroad right-of-way were included in the transfer.

Wilkes-Barre—President White, of the United Mine Workers of America, made his first official visit to the Wyoming region, July 25. He addressed a large mass meeting at Georgetown.

Bituminous

Charleroi—The Globe mine, near Coal Center, has been abandoned, and will not be used again even as an entry to other hills. The shutdown is said to be the result of the flood last week.

Pit posts have been washed out of the mine, and numerous cave-ins resulted. At best, the mine was useful only in reaching other hills of the Vesta Coal Co., so that the cost of fixing it up would be more than it would be worth.

Connellsville—Two miner's lamps, identified as belonging to the two Americans who perished in the Lemont mines of the Frick company, were found this morning by members of the rescuing party. There was no trace of the foreign miner, who also lost his life when the mine was flooded.

Du Bois—The Buffalo, Rochester & Pittsburgh R.R. expects in the near future to double-track their system from Punxsutawney to Josephine. The improvements now being made at the tunnel north of Indiana seem to bear out this theory. The heavy traffic which passes on this line, especially during the night, emphasizes the need of this improvement.

Kittanning—Cobaugh mines, which have not been operated for four years and were supposed to have been permanently abandoned, will be reopened in a few days. The locomotive has been ordered and the track and bridge at Hawthorne are receiving attention. The mines employ from 200 to 300 men.

Uniontown—In spite of the fact that three large pumps have been working continuously since the flood of the Superba mine, the water has receded only 16 in. After 60 hours of continuous work the rescuers succeeded in cutting a hole through the 65-ft. wall separating the Lemont mines, Nos. 1 and 2, in search for miners. It is believed that the remains of the two men are under the débris somewhere in the mine.

At the Superba mine it was decided to drill a large hole from the surface into the mine at a place where the remains of 15 miners, who were drowned last Wednesday, may be. Two 8-in. pumps will be sunk into the mine and the water will be removed from that section.

Waynesburg—One thousand one hundred acres of coal in the Monongahela Township will be transferred by J. V. Thompson to the Poland Coal Co., for $880,000. It is said that the property will be developed immediately.

The coal land fronts on the Monongahela River, near Greensboro, and the new line of the Monongahela R.R., which is just being completed, runs through the property. About 25 acres of surface area are included in the deal.

The Poland Coal Co. expects to erect a large coke plant and begin the manufacture of coke.

Washington

Spokane—Coal promoters are enthused with the great activity which is now manifested in the Bull Mountain coal field in Musselshell County, Mont. A small quantity of coal has been mined in that locality, but the present activity promises that quantities will soon be taken from that county every year.

West Virginia

Charleston—On July 10, James Dillon, fireboss, employed at the Whipple mine, operated by the White Oak Fuel Co., in Fayette County, W. Va., made his usual examination of the mine to detect gas or other dangerous conditions that might exist before the men entered the mine. After completing his inspection, he returned to the outside and reported in the fireboss' record book an accumulation of gas between the last break-through and the face on the fourth left aircourse, but did not fence the place off, or put up any danger signs, or warn the miners of this dangerous condition.

William Smith, a miner, entered the place, ignited the gas and was badly burned, though not fatally. Had the mine been in a dry and dusty condition, there is no doubt but what a terrific explosion would have occurred.

Mine Inspector L. D. Holliday promptly made an examination of the mine, ascertained the facts and caused a warrant to be issued for the fireboss. The latter was brought before the justice of the peace of Fayette County, who, upon hearing all the evidence that was introduced, found the defendant guilty as charged with violating section 13 of the mine law and fined him $50 and costs.

The Department of Mines of the State of West Virginia has revoked the fireboss certificate which was issued to Dillon, and he will not be permitted to act as fireboss in this state unless at some future time he can satisfy the Board of Examiners that such negligence of duty will not occur with him again.

The alarming situation in the strike in Paint Creek Valley still continues. Armed strikers have attacked mining towns, and have killed two coal company guards. It is expected that martial law may be declared within a short time by Governor Glasscock. Meanwhile troops are being hurried to the scene.

It was also reported that Private Ullman of the state militia had been apprehended by ten of the mine guards, and taken before Justice of the Peace Crawford, where, according to an affidavit made by him, he was searched and relieved of $2 and ordered to retrace his steps.

Fairmont—The Parker Run Coal & Coke Co. has closed a 5-yr. contract with the McKeesport Tin Plate Co. involving 500 tons of coal to be delivered by river shipments. The Parker company has completed a deal for a number of additional coal barges and tow boats, the details of which have not as yet been made public.

Huntington—We hear that 60,000 acres of valuable coal and timber land on Big Coal River are to be purchased soon by a number of Philadelphia capitalists for mining and timber purposes.

This is the first step in a series of developments on a large scale which has been contemplated in Boone County for some time.

Rivesville—An announcement has been made that the Buckhannon & Northern RR., jointly owned by the Baltimore & Ohio, the Pittsburgh & Lake Erie, a subsidiary of the New York Central System, and the Pennsylvania, extending from Rivesville to the Pennsylvania state line has been completed and will be put in operation shortly. This line will tap about 60,000 acres of coal land owned by the Little Kanawha Syndicate in West Virginia and will be the means of opening this vast tract of land for development purposes.

Wheeling—A large force of men are employed at present, preparatory to opening a coal mine on the Stark Mine on Edgenton Lane. All new machinery is being installed. Two motors are being put in and a new slope dug to the coal seam. When completed the mine will be one of the most up-to-date and will be operated by strictly union men. It will be equipped with the latest electrical equipment throughout.

Wyoming

Cheyenne—Representatives of coal mine owners and miners have reached an agreement after a ten-day conference here, and the threatened strike of 10,000 miners has been averted. The new agreement, which will not expire until September 1, 1914, provides for substantial wage increases.

Canada

Quebec

Montreal—The Grand Trunk will construct a new line from Fort Burwell to London, to carry coal from the lake boat for distribution in western Ontario. The road has already been surveyed. The Grand Trunk is said to be constructing ferries to carry loaded coal cars across Lake Erie to connect with the new line.

England

Northumberland

Blyth—An improved type of coal carrying vessel has just been launched here, which, in the opinion of experts, will begin a new era in the building of cargo ships. The vessel is constructed on what is known as the "arch" principle, which, it is claimed, offers important advantages over both of the ordinary types with a dead weight of 3100 tons and a draft of 18 ft. 4 in. It is asserted to be the fastest collier built, and it will be used for coaling purposes in connection with the British fleet. Small capital, cheaper maintenance, and increased rate of speed are among the favorable features claimed for the vessel.

New Zealand

The United States supplies New Zealand with only one-fourth of its imports of mining machinery. The greater part of the remainder comes from the United Kingdom.

Mining machinery from British countries is admitted free, but there is a tariff of 10 per cent. on machinery from countries outside of the British Empire.

Industrial Notes

The Roberts & Schaefer Co., contractors for coal-mining plants, coal washeries, coaling station, and briquetting plants, of Chicago, Ill., have recently been awarded the following contracts:

A 600-ton reinforced-concrete Holmen coaling station for the Atlantic & West Point Ry. Co., to be built at Newman, Ga. $25,000.

A similar station for the Western Ry., Ala., for installation at Montgomery Terminal, Ala. $25,000.

A large reinforced-concrete cinder pocket and cinder-handling machinery for the Pittsburg & Lake Erie R.R., for installation at Dickerson Run, Penn. $20,000.

A 300-ton structural-steel Holmen coaling station by the Elgin, Joliet & Eastern R.R., for installation at Rossville, Ill.

Coal-handling equipment for a new coaling station to be built at Cumberland, Md., for the Baltimore & Ohio R.R. Co.

The Taylor Iron & Steel Co., Highbridge, N. J., announce the opening of an office in Pittsburgh, Penn., at 301 Oliver Building. This office is opened in answer to the increasing demand for Tisco manganese-steel castings in Pittsburgh and vicinity.

J. S. Morrison will be in charge of the Pittsburgh office.

The Connellsville Manufacturing & Mine Supply Co., Connellsville, Penn., will soon put upon the market a new type of coke pusher, leveler and conveyor. With the new machine, the pusher, instead of being a telescope ram, will be continuous. The conveyor will take the coke out of the oven to the cars, and the leveler will gage the coal in the oven when they are refilled.

To meet the demands for compact locomotive coaling stations of low cost, the Link-Belt Co., of Philadelphia and Chicago, has designed a unique apparatus. The structure is of steel, 6x16 ft. in size, and stands between a car siding and the locomotive track.

Under the coal siding is a steel-track hopper, into which the coal is dropped. A reciprocating feeder delivers the coal at a uniform rate to a line of chain and buckets. These buckets lift the coal to a height sufficient to chute to the locomotive tender at the rate of one ton per minute.

The machinery is driven by motor or gasoline engines, which is placed in a house between the two legs of the steel structure. A platform runs all around the top of the structure and a stairway leads to it from the ground.

This coaling station is not suitable for places where large quantities of coal must be carried in storage bins, but there are many railroad yards where space is valuable and where drop-bottom cars can be held in reserve with the necessary tonnage and thus act as storage hoppers.

Considered as a fireproof bin, a drop-bottom car at $900 is a comparatively cheap means of providing storage for 50 tons coal. A station of this kind can be built for less than $4000 complete. It is compact, fireproof, and one man can attend to the machinery, as well as unloading the drop-bottom cars. The control levers are arranged so that the machinery can be stopped and started readily from several points.

Publications Received

SHEET STEEL PILING. Tables and Data on the Properties and Uses of Sections. Carnegie Steel Co., Pittsburgh, Penn. 88 pp., 5x7½ in., 22 tab., 54 illus. 9th ed., July 1, 1912.

The information and data in this booklet have been gleaned during the many years of experience which the Carnegie Steel Co. has had in this field. Among other things, the booklet deals with the three principal types of sheet piling, manufactured by the Carnegie Steel Co. The United States steel sheet piling is a simple, plain rolled section, ready for use as it comes from the mill without further fabrication. Each piece is complete in itself and all pieces of the same width are interchangeable. Line contact, instead of surface contact, avoids wedging action, so common in piling, and thereby facilitates pulling. The joints are flexible and permit the entrance of silt and clay into the interlock, thus aiding in securing watertightness.

The Friestedt interlocking channel-bar piling consists of a fabricated section made of channels and of Z-bars. These sections are unsymmetrical in that one channel has two Z-bars full lenth, and the next channel is plain. For this reason the sections possess a high salvage value, in that some 40 to 45 per cent. of the channels can be withdrawn and used for structural purposes after their temporary use as sheet piling has been completed.

The symmetrical interlock channel-bar piling is similar to the one just mentioned, its chief point of difference being that each channel is provided with a long Z-bar on one edge and a short Z-bar on the other.

The lateral strength of the various sections are discussed at some length, and many tables are given to aid the engineer. Methods of driving, together with various types of hammers, receive their share of attention.

The booklet is neat in appearance and the arrangement is good. It should be a valuable asset to contractors and their construction engineers.

Recent Coal and Coke Patents

Cableway bottom-stop. T. S. Miller, S. Orange, N. J. 1,031,360. July 2, 1912. Filed Aug. 23, 1911. Serial No. 605,621.

Coal leveling apparatus. J. M. Reis, Newcastle, Penn. 1,031,375, July 2, 1912. Filed June 24, 1909. Serial No. 504,033.

Mechanical stoker, W. N. Ducan, Allen, Ill. 1,031,253, July 2, 1912. Filed Mar. 18, 1912. Serial No. 684,564.

Coal tipple. A. Allen, assignor to Allen & Gracia Co., Chicago, Ill. 1,032,800, July 16, 1912. Filed Dec. 29, 1911. Serial No. 668,511.

Mine insulator. S. A. Warren, Cannon City, Colo. 1,031,975, July 9, 1912. Filed July 14, 1911. Serial No. 640,164.

Miners' lamp. S. L. Flinn, Wilkes-Barre, Penn. 1,032,130, July 9, 1912. Filed April 10, 1911. Serial No. 619,947.

Construction News

Pineville, Ky.—H. B. Jones, H. E. Bullock and W. C. Black have formed a company and leased a large tract of coal land near Hazard, Ky. They are in Perry County, along the extension of the Lexington & Eastern R.R., which is rapidly approaching completion. A mining plant is to be installed shortly, so as to enable the company to participate in the fall trade.

Birmingham, Ala.—The Galloway Coal Co. has placed a force of men near Carbon Hill to open up a large new mine at that place. James Nicol is the superintendent in charge. The mine will have a daily capacity of 1000 tons.

Patton, Penn.—The West Branch Coal Co. is to extend its operations at Barnsboro, according to an announcement made recently. A new mine, and possibly two will be opened, and the concern wil be able to furnish steady employment to over 600 additional men.

Flint, Mich.—Owners of the What Cheer mine, near here, have begun sinking a shaft a half a mile from the City Limits, and will spend $20,000 on the development.

San Antonio, Tex.—The Poteet Coal & Sand Co. has been organized here, with a capital stock of $15,000. It will install a large amount of machinery and equipment.

Springfield, Mass.—The gigantic coal elevator being erected by the Burr Co., which has been in the process of construction for a month or so, is expected to be completed in a short time.

The elevator has a capacity for 1200 tons of coal, and is loaded from the cars by a chain of shovels operated by a 6-hp. motor, now being installed. The new arrangement will facilitate the fali delivery of coal which has been delayed owing to the company waiting until completion of the elevator.

Hicks Run, Penn.—The New York city capitalists have purchased all the coal and clay lands and expect to open them in the very near future. These people will build a large firebrick plant and will develop coal and clay veins.

Barnesboro, Penn.—Actual concrete work on the new electric plant of the Clearfield Coal Corporation at the Westbranch mine has been started under the direction of Thomas Kirkland. The foundations for each of the two big dynamos and their engines are 22x22x8 ft., and each foundation necessitates 3872 cu.ft. of concrete.

St. Louis, Mo.—The Malcomson Briquette Engineering Co. has been incorporated to build a coal briquetting plant, equipped with machines of the St. Louis Briquette Machine Co. The capital stock is $24,000. half paid.

The company will not engage in manufacture of briquettes for itself, but it will construct them for other concerns.

Johnstown, Penn.—Developments indicate a new mining operation in the vicinity of Johnstown. This operation is located along the B. & O. Ry., and runs back of Stony Creek just above Birder's Dam, and includes 1000 acres.

Spokane, Wash.—The Palouse Coal & Ore Co. has started actual coal mining in Putman County. After nearly a year of prospecting a shaft has been sunk near the mouth of Cedar Creek and the owners are confident of success.

Coal Trade Reviews

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

The anxiety in the Eastern anthracite market still prevails, and the companies say that unless they get a larger allotment than anticipated, the end of the present month will see no improvement in the situation. It is not believed that the tonnage will improve any as there are still large quantities to be shipped to the Western market. The activity in general remains unchanged, and the only problem with the shippers is the provision of an equitable distribution of their production in such a manner as to cause the least complaint.

The bituminous market has never been so good at this period, for a number of years. While there is no heavy demand, the trade is on a firm basis and shows every indication of holding strong for the remainder of the season. This shows how effective a curtailment policy may be and consumers are finding how easy it is to overstay a soft market.

While there is no actual increase in the Eastern bituminous business, the general tone remains quite firm. Supplies in the hands of the consumers appear to be rather low, and should they be obliged to go beyond actual contract requirements, there will soon be an active spot market.

At Buffalo there is an increasing demand, especially in slack, while transportation is growing steadily worse. Shippers are aggressively complaining about the slow movement, and state that when the active demand opens up it will find the railroads in a deplorable condition. In the Pittsburgh district the manufacturing demand is moderately good and shows some improvement, while the Lake movement is still somewhat congested and shipments slightly decreased.

Production in the Ohio fields has been fairly active, especially in the domestic, and operators are now of the opinion that the season on this grade has opened. Prices have been ruling firm, and in view of the car shortage, which is slowly developing, companies are discussing an increase in the circular. There has also been an unusual activity in West Virginia and prices are much firmer; this has been the most active midsummer week for several years, and no further tonnages are being booked at less than circular.

In the Middle West there are no signs of the usual summer dullness, while a higher price level is being freely predicted. The demand is so strong and active that it is taxing the capacity of the mines in some districts.

Boston, Mass.

Bituminous is firm, without any heavy demand as yet, but strong at list prices. Pocahontas and New River are now apparently in strong position for the balance of the year. There are signs of caution about commitments ahead, and if any off-shore business develops at Baltimore and Hampton Roads there will be an active market sometime between now and January. Not for some years has a turn in bituminous come in early August, and it shows how effective a curtailment may be made, and incidentally how easy it is for buyers to overstay.

The Pennsylvania grades share the general firmness in prices. Spot coal is now being held by some of the shippers at an advance over the contract figure, and the shippers of Georges Creek are beginning to mark up freights on water transportation. Vessel rates have also advanced slightly, and higher rates are expected.

Anthracite continues to cause general anxiety and reports are disquieting. There is said to be a very large tonnage yet to be shipped to Western depots, and unless the East gets a much larger allotment than is now anticipated, August will not show up much better than July. Many of the anthracite barges that show clearances from New York prove to be loaded with pea and dock screenings, sizes that convey little relief to the dealer with thousands of orders on his books for the domestic grades.

Wholesale quotations are about as follows:

Clearfields, f.o.b. mine	$1.10@1.30
Clearfields, f.o.b. Philadelphia	2.35@2.60
Somersets f.o.b. mine	1.15@1.35
Somersets, f.o.b. Philadelphia	2.40@2.60
Pocahontas, New River f.o.b. Hampton Roads	2.70
Pocahontas, New River f.o.b. Boston	3.65
Pocahontas, New River on cars Providence	3.55
Anthracite stove f.o.b. New York	5.20@5.50

New York

Anthracite—The movement of hard coal into New York continues slow with no indication of any improvement in sight; nearly all sizes are in short supply with some commanding a good premium. This shortage is more pronounced in the stove size which is practically out of the market; it will readily bring an advance of 20c. above the circular when obtainable. Egg appears to be about in the same condition except that no premiums are being offered yet. Of the three sizes, chestnut is the longest, especially the Lehigh grades which are being quoted 10 to 15c. off the circular. Pea is in steady demand, with little offering at off prices, while individual Reading, buckwheat No. 1 is being quoted at as low as $2.15 f.o.b. The better grades of individual Reading rice are selling at 10c. less than the circular, and the poorer grades 20c. less.

The following are New York quotations at the points noted:

	Upper Ports	Lower Ports
Broken	$4.90	$4.50 @ 4.90
Egg	5.15	5.05 @ 5.10
Stove	5.15	5.10 @ 5.20
Nut	5.40	5.20 @ 5.35
Pea	3.50	3.30 @ 3.45
Buckwheat	2.75	2.15 @ 2.55
Rice	2.25	1.75 @ 1.95
Barley	1.75	1.60 @ 1.70

Bituminous—The market for this grade is quiet, but shows a firmness quite in keeping with the optimistic view which appears to prevail among the larger companies. Little or no coal is coming in on speculation with the result that the demurrage consignments are quite rare. It it becoming obvious that the companies are making a concerted effort to maintain better market conditions by adopting a vigorous curtailment policy.

The market as a whole is on a firm, substantial basis rather unusual for this period of the year. Prices are holding well and there is no reason for expecting a slump from now on until the fall trade opens up.

New York bituminous quotations are comparatively firm as follows:

West Virginia, steam	$2.35
Ordinary grades, Pennsylvania	2.45
Fair grades, Pennsylvania	2.55@2.65
Good grades, Pennsylvania	2.70@2.75
Best Miller, Pennsylvania	2.95@3.00
Georges Creek	3.15

Pittsburgh, Penn.

Bituminous—The market has not improved except that slack is not so plentiful, on account of lighter shipments in the Lake trade in the past fortnight. Manufacturing demand is moderately good, and has shown some improvement. The Lake movement continues rather congested, and shipments have been somewhat decreased in consequence. For ordinary lots of mine-run and nut, we quote $1@1.05, ¾-in. being $1.25 asked and 1¼-in. $1.35 asked, with sales effected at 5@10c. less. Slack is slightly stiffer, and is bringing about 50c.

Connellsville Coke—Since the break in the ranks of sellers of Connellsville coke there has been some quiet selling of prompt at various prices, which has relieved the situation, there now being no coke loaded on cars and pressing for shipping instructions. Sales were made at $2.20 and

probably less, but the market is now firm at $2.20 and $2.25. Furnaces have continued to hold off from making inquiries, as they are covered for the time being, but they are keenly interested in the situation and would probably contract for the balance of the year if prices at all favorable were named. Meanwhile those not provided are likely to buy for August only. Some sellers would probably accept $2.25 on contract for a limited tonnage, though $2.35 is the regular asking price. Foundry coke remains quotable at $2.40@2.50 for prompt and $2.40@2.75 for contract.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ending July 27 at 315,723 tons, a decrease of 40,000 tons, and shipments at 3527 cars to Pittsburgh, 4920 cars to points west and 930 cars to points east, a total of 9377 cars, a decrease of 1262 cars.

Baltimore, Md.

While there was no actual increase in business during the past week, the Baltimore coal market maintains a firm tone, and the impression still prevails that an improvement will set in shortly. It has been purely a contract market during the past week, practically all the coal delivered being under orders signed up around the first of April and May. The spot business which developed about 10 days ago, due to canning factories resuming operations, has eased up, but the hopeful feeling has by no means disappeared.

The trade here believes that the situation is most promising and that if business conditions continue to improve as they are at this time, there will soon be an active demand for coal. Consumers who are now keeping within contract requirements will soon be obliged to go beyond them, and when this occurs the more profitable spot business will set in. There was no material change in prices during the week.

The Davis Coal & Coke Co., through the selling agency of B. Nicoll & Co., has been awarded the contract to furnish 20,000 tons of coal to the Government Hospital for the Insane in Washington.

Buffalo, N. Y.

There is a steadily increasing demand for bituminous coal and shippers are complaining more and more of the slow movement of cars and predicting that the climax of the season will see transportation conditions in a deplorable shape. Some shippers are already tracing cars more than they should be at this time of the year.

The heavy demand is for slack, with Allegheny Valley far in the lead. With the market full of Pittsburgh and West Virginia slack there is no Allegheny Valley surplus. The demand for coke is very active, with prospects of an advance soon. Best Connellsville foundry is very strong at $4.50 and the cheaper grades are equally so. It is hard to get men enough anywhere to handle the ovens.

Pittsburgh quotations are a little stronger every week, though it is too early to look for a general advance. Figures remain at $2.57½ for three-quarter, $2.47½ for mine-run and $2 for slack, with Allegheny Valley sizes about 25c. lower.

The anthracite activity is unchanged, the only problem with the shippers now being how to divide up their scant supplies so there will be least complaint. The independent mines are turning over more coal to jobbers here than formerly, but they are about as short as anyone.

There is an increase in shipments of anthracite by Lake, the amount for the week being 163,000 tons, which swells the July total to 588,885 tons. The amount for the season is still running down, as compared with last season, being 1,065,385 as against 1,907,723 to August, 1911.

Hampton Roads, Va.

Hampton Roads has just had probably the best midsummer week for several years. Two records were made, one being the loading of 7524 tons of cargo and bunker coal at the Sewell's Point Virginia Ry. piers Thursday in 5 hr. and 15 min., possibly exceeded only by Curtis Bay record made Nov. 23, 1911, when 7574 tons were put aboard one vessel in 4 hr. and 55 min.; an especially noteworthy feature was that no preparation was made for a record loading. The other record was made the following day at the N. & W. piers when they dumped 612 cars or 26,851 tons in 24 hrs. This unusual activity can mean but one thing, and that good business for Hampton Roads shippers. One large shipper here is known to already have charters reported for over 70,000 tons of coal to be taken during August. As result of the good demand, prices are much firmer and no one is willing to book any future tonnage at less than the circular price.

Figures for July dumping here show up very satisfactory as will be seen by reference to the table on the last page. The Norfolk & Western piers while not holding up to their customary proportion, dumped 450,983 tons.

The C. & O. Ry. are having some trouble in getting coal through to the piers promptly, due it would seem, to a shortage of motive power equipment.

Columbus, Ohio

The first appearance of a car shortage was noted in the Hocking Valley district last week, and, as a result, operators are discussing the probabilities of a higher circular about Sept. 1. The car shortage has been freely predicted for some time, but while it has been felt to a certain extent in the eastern Ohio district, it had not, up to this time, affected the Hocking Valley.

There has been a slight increase in the demand for the domestic sizes and operators and jobbers are of the opinion that the domestic season has finally opened. Prices are ruling firm at the circular figures which have prevailed for several months. One of the best features is the strengthening in the small sizes, due to a lighter tonnage going to the Lakes from certain sections of the state. The Lake trade is continuing active, although some congestion is reported from the docks of the upper Lake ports. Prices on the docks are ruling the same as prevailed for the entire season.

Steam business is running along steadily, although some manufacturing establishments are increasing their requisitions. The general tone of business is good and factories are having a better run of orders.

Production in various Ohio fields has been fairly active during the past week. In the Hocking Valley the output was up to normal and an increase is reported from eastern Ohio, where the Lake trade is quite a factor.

Quotations in Ohio fields are:

Hocking Valley	
Domestic lump	$1.50
¾-in	1.35
Nut	1.10
Mine-run	1.15
Nut, pea and slack	0.45
Coarse slack	0.35
Pittsburgh No. 8	
¾-in	$1.10
Mine-run	1.00
Coarse slack	0.40
Pomeroy Bend	
Domestic lump	$1.50
¾-in	1.35
Nut	1.20
Mine-run	1.15
Nut, pea and slack	0.40
Coarse slack	0.30
Kanawha	
Domestic lump	$1.50
¾-in	1.30
Mine-run	1.05
Nut, pea and slack	0.45
Coarse slack	0.35

Indianapolis, Ind.

There is apparently no signs of the usual mid-summer dullness in the coal-mining industry. About all the miners are now employed, and the coal is moving more regularly than last week. There is also some talk of prices going higher, the trend of the market being towards a stronger and higher level for the coming winter. Dealers say there is a shorter supply of Eastern coal now than last year and there is also a shortage of 15,000 tons of anthracite. Now that the requirements tax the capacity of the Central States mines there need be no surprise that the prices have been increased slightly.

The operators are not over their car-shortage fright, and are unanimous in the belief that the heavy demands from other

sources will create a provoking scarcity this fall. Aside from the repeated demand for fulfillment of the law requiring a weekly pay-day, the Indiana miners are doing as well, if not better, than for several years past.

Detroit, Mich.

Bituminous—Things are quite different in this market from 30 days ago; everyone is anxious to get under cover for fuel, and are stocking as heavily as possible in order to avoid the unusual conditions which are sure to come when the consumers do not lay in a large supply. There is no track coal whatever, and it is now absolutely impossible to get fuel on spot shipments. The market is in a measure very good at present.

The following prices prevail:

West Virginia	
Domestic lump	$1.75
¾-lump	1.15
Mine-run	1.05
Slack	0.75
Hocking	
Domestic lump	2.00
¾-lump	1.25
Mine-run	1.15
Slack	0.70
Cambridge	
¾-lump	1.05
Mine-run	0.95
Slack	0.80
Pocahontas	
Lump and egg	2.50
Mine-run	1.10
Slack	0.85

Anthracite—There is a scarcity on all sizes. The demand is unusually heavy owing to the fact that a hard-coal famine is predicted for this point. No one seems to have any quantity on hand, and it is rumored that the price will advance 50c. a ton within the next 30 days.

Prevailing prices are as follows:

Egg and stove	$7.50
Chestnut	7.75
Pea	6.75
Buckwheat	4.50

Coke—There is an abundance of this product now coming into Detroit, but prices still remain quite firm. Connellsville is quoted at $4.85, and Solvay at $5 per ton.

Chicago

There was an advance Aug. 1 in the circular price of smokeless mine-run to $1.25, and of smokeless lump and egg to $2 a ton at the mines. The market has been further strengthened within the past few days by difficulties at the mines which curtailed shipments.

There has been no improvement in the steam-coal business, an increased supply of screenings, due to a larger production of lump, causing weakness in the former size. The demand for anthracite is unusual for this time of the year, which is attributed to the fact that orders, which ordinarily would be placed a month or six weeks previously, are only now being sent in.

Unusual strength is being shown in the coke market, particularly for gas-house coke. Prices, however, have not advanced.

Prevailing prices at Chicago are:

Sullivan County	
4-in. lump	$2.47
Egg	2.37
Mine run	1.99½
Screenings	1.72@1.82
Springfield	
Domestic lump	$2.17@2.32
Steam lump	1.87@1.97
Mine-run	1.82
Screenings	1.57@1.62
Clinton	
Domestic lump	$2.27
Steam lump	2.12
Mine-run	1.92
Screenings	1.67@1.72
Pocahontas and New River	
Mine-run	$3.30
Lump and egg	4.05

Coke—Prices asked for coke are: Connellsville, $5@5.10; Wise County, $4.85 @5; byproduct, egg and stove, $4.75; byproduct, nut, $4.55; gas-house, $4.50.

Minneapolis—St. Paul

Business in the Twin Cities and the Northwest has been very brisk and prices were much stronger during the past two weeks than heretofore. There is much less price cutting by the big companies as they realize that they have no such stocks as was the case at this time last year. Wholesalers are urging the dealer to stock up during this month as far as possible as the general impression is that there will be a big car shortage in the fall.

It is well understood by the producers in the East and the Dock people that it will be next to impossible to fill the docks with sufficient coal to supply what is known as Dock territory, during the coming winter. The season is slipping by fast and the supply on the docks is away below normal.

The Dock Workers' strike at the head of the Lakes is not causing much worry as strike breakers were sent up there from the Twin Cities and Chicago, and unloading is progressing in fair shape. The strike at Port Arthur is of a more serious nature, as all work has been suspended; and unless something can be done by the Dock companies soon it looks as if there would be something in the nature of a blockade. At the present time three of the biggest lake carriers are held up with big cargoes and no one to unload them.

St. Louis, Mo.

There has been a gradual toning up of the market since the first of the month, and there are times when the different sizes of Carterville coal are hard to get. Screenings and fine coal are plentiful and prices low, while on the washed sizes there is a rather unsteady market. There is a fairly good demand now for standard lump, but the market on screenings is falling off.

Anthracite is hard to get and coke is in good demand, but there seems to be a scarcity; the same thing applies to smokeless. It is almost impossible to get smokeless into the St. Louis market now, and when it does come in it is anywhere from $2.10 to $2.25 at the mines.

The prevailing market is:

Franklin County	
6-in. lump and 3x6 egg	$1.40@1.60
Nut	1.40@1.50
2-in. screenings	0.70@0.75
Carterville	
Lump and egg	$1.25@1.40
No. 1 nut	1.15@1.25
2-in. screenings	0.60@0.70
No. 1 washed	1.45@1.50
No. 2 washed	1.25@1.30
No. 3 washed	1.10@1.15
No. 4 washed	1.00@1.05
No. 5 washed	0.75@0.80
Mount Olive	
6-in. lump	$1.35
2-in. lump	1.25
Standard	
6-in. lump	$1.00@1.05
2-in. lump	0.85@0.90
Screenings	0.50@0.60
Mine-run	0.85@0.90

Coke and anthracite are the same as quoted the first week in August.

Spokane, Wash.

Spokane is on the verge of a general increase in fuel prices; commencing the first of August, all orders were increased 25c. per ton and on or before the first of September an advance of 50c. per ton is expected on practically all kinds of coal.

A recent decision by the Interstate Commerce Commission gives Utah dealers a differential rate of not more than 25c. more than Montana and Wyoming dealers and the former will, for the first time, enter into competition with the other producers for Spokane trade. The first shipment from Utah is expected about Sept. 15.

The following is a statement of prevailing prices as compared with those for the corresponding period last year:

	1912	1911
Rock Springs (Wyoming)	$9.00	$9.10
Roslyn Steam (Washington)	6.25	6.25
Bellview Steam (Canadian)	6.25	6.15
Bellview Furnace (Canadian)	8.35	8.25
Owl Creek (Wyoming)	9.00	9.00
Carney (Wyoming)	8.25	8.35
Roundup (Montana)	8.00	8.00
Bear Creek (Montana)	8.25	8.25
Hill Crest Steam (Canadian)	6.25	6.25
McGillvray Steam (Canadian)	6.25	6.25
Corbin (Canadian)	6.25	6.25

Portland, Ore.

Some difficulty is being experienced in getting coal, owing to the car shortage on the Union Pacific. This is due to the heavy shipments of lumber and the beginning of crops movement. Owing to this condition of affairs no summer rates have been announced and the prices of Wyoming coal are $9.50 delivered in 3-ton lots or $10 in smaller quantities. There is said to be very little probability of any Australian coal coming here this fall on account of the high charter rates.

San Francisco, Calif.

Receipts of coal by sea for last month totalled 33,678 tons, 20,806 tons coming from British Columbia, 9258 from Australia and 3614 tons from Seattle; the latter for use on the Pacific Coast steamers.

Up to date deliveries for this month have been exceptionally small; so far only 4830 tons have arrived from British Columbia, and none at all from Australia. No coal came in for the government in June, but this month it has already received three cargoes of Pocahontas, aggregating 17,379 tons.

Prices to the trade are as follows, per short ton:

Wellington (British Columbia)	$8.00
Pelau Main (Australia)	8.50
Rocky Mountain	8.50
Cumberland	12.50

Production and Transportation Statistics

Sault Ste. Marie Canals

Coal movement through Sault Ste. Marie Canals, season to July 1, short tons:

	1911	1912	Changes
Anthracite	520,000	224,908	D. 295,092
Bituminous	3,689,282	3,715,397	I. 26,115
Total	4,209,282	3,940,305	D. 268,977

The decrease this year was entirely due to the light anthracite shipments in May.

Pennsylvania Railroad

Statement of coal and coke carried on the P. R.R. Co.'s lines east of Pittsburgh and Erie during June and the first six months with the increase or decrease over the same period last year, in short tons:

	June 1912	6 Months	Difference
Anthracite	883,326	4,572,269	—1,463,631
Bituminous	3,562,845	22,519,781	+2,771,068
Coke	1,033,381	6,374,293	+1,125,744
Total	5,479,552	33,466,343	2,433,181

Imports

Total imports of bituminous coal for June this year amounted to 133,095 tons as compared with 76,161 tons for the same month last year; imports for the 12 months ending June 30 of this year were 1,300,242 tons as compared with 1,761,210 tons for the same period last year.

Atlantic Coastwise Movement

The following is a comparative statement of the fuel shipments from five principal Atlantic ports for May, 1911-12, and for the five months of the current year, in long tons:

Port	May 1911	May 1912	Five Months
New York	2,237,259	1,520,454	10,691,954
Philadelphia	623,632	589,217	2,581,337
Baltimore	386,365	284,191	1,604,397
Newport News	233,593	272,775	1,245,180
Norfolk	330,447	494,369	2,133,754
Total	3,811,242	3,161,006	18,256,622

Statement covers more than 90% of fuel handled at ports noted, and includes bunker coal supplied vessels in foreign and domestic trade. Tonnages for Norfolk include amount shipped by Virginian Ry. at Sewell Point.

Norfolk & Western Ry.

The following is a comparative statement of the coal and coke shipments over the lines of the N. & W. Ry. for the months of June, 1911-12, and the first six months of the current year, in short tons:

Destination	May 1911	May 1912	Six Months
Coal			
Tidewater, foreign	78,481	121,972	834,554
Tidewater, coastwise	250,161	297,636	1,814,298
Domestic	1,179,207	1,569,697	8,417,511
Coke			
Tidewater, foreign	4,745	3,070	40,904
Domestic	97,842	97,527	701,308
Total	1,610,436	2,089,902	11,808,575

Various Railroads, Rivers and Canals

The following is a comparative statement of the fuel movement over various railroads, rivers and canals for May, 1911-12.

Railroads	1911	1912
Baltimore & Ohio[2]	2,948,461	3,414,714
Buffalo, Rochester & Pittsburgh[3]	639,744	668,853
Buffalo & Susquehanna[3]	164,429	123,112
Chesapeake & Ohio[4] [4]	1,175,202	1,632,261
Erie[4]	633,600	143,713
Huntington & Broad Top Mountain[2] [3]	76,345	72,942
New York Central & Hudson River[3]	725,135	605,729
Norfolk & Western[2] [3]	1,663,082	2,062,044
Pennsylvania (East of Pittsburgh & Erie)[2] [5]	4,883,950	4,754,437
Pittsburgh & Lake Erie[2] [5]	1,263,005	1,391,968
Pittsburgh, Shawmut & Northern[3]	123,061	181,372
Southern[4]	301,684	359,332
Virginian[2] [3]	203,971	311,267
Western Maryland	209,794	274,749
Rivers and Canals		
Barren River, Lock No. 1	152	200
Black Warrior River, Lock No. 12	1,052	551
Canal and Falls at Louisville	68,210	240,892
Chesapeake & Delaware Canal	8,915	2,886
Chesapeake & Ohio Canal	25,340	20,179
Davis Island Dam	102,320	366,040
Green River, Lock No. 1	2,736	2,464
Kanawha River, Lock No. 11	106,440	71,300
Kentucky River, Lock No. 1	7,800	2,563
Monongahela River	824,633	1,011,531

[1]Figures throughout this table have been reduced to a uniform basis of short tons.
[2]Includes coal received from connecting lines.
[3]Includes company's coal.
[4]April and four months' figures.
[5]Does not include company's coal hauled free.

Ohio Coal Traffic Statement

The following is a comparative statement of bituminous shipments over the principal Ohio railroads for the first five months of the current year and last year, in short tons:

	1911	1912
Hocking Valley	1,188,233	1,559,910
Toledo & Ohio Central	614,194	726,759
Baltimore & Ohio	704,083	943,041
Wheeling & Lake Erie	1,221,868	1,589,128
Cleveland, Lorain & Wheeling	792,710	1,245,273
Zanesville & Western	422,096	498,427
Pennsylvania Co	972,019	2,329,990
Lake Erie, Alliance & Wheeling	480,404	463,945
Marietta, Columbus & Cleveland Ry	12,504	51,629
Wabash, Pittsburgh Terminal Ry	30,364	11,157
Kanawha & Michigan Ry	22,280	64,387
Detroit, Toledo & Ironton		110,530
Total	6,460,755	9,603,076

Foreign Markets

Great Britain

The market presents no change; business continues slow. Smalls still remain firm, and have advanced somewhat. Prices are approximately as follows:

Best Welsh Steams	$4.08 @ 4.14
Seconds	3.84 @ 3.96
Thirds	3.60 @ 3.72
Best Dry Coals	3.96 @ 4.08
Best Monmouthshires	3.72 @ 3.78
Seconds	3.48 @ 3.60
Best Cardiff Smalls	2.66 @ 2.78
Seconds	2.47 @ 2.59

The prices for Cardiff coals are f.o.b. Cardiff, Penarth, or Barry, while those for Monmouthshire descriptions are f.o.b. Newport both exclusive of wharfage, and for cash in 30 days—less 2½%.

Financial Notes

Island Creek Coal Co.—This company has declared an initial quarterly cash dividend of 50c. per share and a common stock dividend of $3 per share, payable Aug. 1 to stock of record July 15. Regular dividends of $1.50 per share was declared on preferred stock payable July 1 to stock of record June 22.

The Mahoning Coal R.R. Co.—This company declared the usual semiannual dividend of $5 a share on its common stock, payable Aug. 1, to holders of records July 15. The regular semiannual dividend of 2½ per cent. on the preferred has also been declared, payable July 1, to holders of records June 20.

Reading Co.—This company's statement of earnings for March is a remarkable exhibit when contrasted with that of the same month of a year ago. Allowing for all charges and preferred dividends, common-share balance was $1,466,652, equivalent to 2% of $70,000,000, common stock. March a year ago produced just ½ of 1%.

Colorado Fuel & Iron Co.—Declaration of a dividend of 5% on the preferred stock accounts for the activity of late in the securities of this corporation. The last previous preferred dividends of 4% were declared for the six months ended Dec. 31, 1902, or nine and a half years ago and, as the preferred stock is cumulative the unpaid and accrued preferred dividends at the close of June this year will total 71% after taking into consideration the 5% dividend just declared.

Delaware & Hudson Co.—An increase of 9½% in the tons of coal mined by this company during 1911 as compared with 7.2% in the anthracite region generally, produced an increase of over $1,500,000 in gross coal earnings. Taxes, construction and betterment expenditures of $823,655 compared with $766,674 in 1910 produced a net deficit from coal mining of $24,300. Dividends and interest received gave the company $284,219 for its income account from coal mining department.

Lackawanna Coal & Lumber Co.—This company owns in fee simple 53,000 acres of coal and timber lands in West Virginia, including 22,500 acres purchased from the Lackawanna Coal & Land Co. in Nicholas and Clay Counties, about 40 miles by water from Charleston; 17,500 acres purchased from the Crescent Coal & Lumber Co., located in Boone County, 16 miles south of Charleston; 13,000 acres purchased from the Coal Valley Land Co. in Boone County, adjoining the Crescent lands.